C. F. T. R. I.
FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.
10/12

COMMERCIAL FISHERIES
ABSTRACTS

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

USE OF FUNDS FOR PRINTING THE ABSTRACTS WAS APPROVED BY
THE DIRECTOR OF THE BUREAU OF THE BUDGET, APRIL 18, 1968

UNITED STATES DEPARTMENT OF THE INTERIOR
Walter J. Hickel, *Secretary*
Russell E. Train, *Under Secretary*
Leslie L. Glasgow, *Assistant Secretary*
for Fish and Wildlife, Parks, and Marine Resources
Charles H. Meacham, *Commissioner*, U.S. FISH AND WILDLIFE SERVICE
H. E. Crowther, *Director*, BUREAU OF COMMERCIAL FISHERIES

DIVISION OF PUBLICATIONS
Leslie W. Scattergood, Chief

EDITORIAL STAFF
COMMERCIAL FISHERIES ABSTRACTS

Frank T. Piskur	Editor
Lena Baldwin	Associate Editor
Gladys K. Chandler	Editorial Clerk
F. Bruce Sanford	Editorial Adviser
Maurice E. Stansby	Technical Adviser

Members of the fishing industry and allied interests who wish to receive COMMERCIAL FISHERIES ABSTRACTS should write to:

Bureau of Commercial Fisheries
Division of Publications
Bldg. 67, U.S. Naval Air Station
Seattle, Washington 98115

A description of the numbering system is contained in FISHERY LEAFLET No. 232: "FISHERY TECHNOLOGICAL ABSTRACT CARD SYSTEM," by Maurice E. Stansby, K. L. Osterhaug, and F. Bruce Sanford. The Leaflet is obtainable free from this Bureau.

To use the abstracts fully, the reader should cut along the lines dividing them and file them by the number in the upper left-hand corner.

The Bureau assumes no responsibility for accuracy of material from outside sources and can fulfill requests for copies of articles only if the abstract were taken from a Bureau publication. Requests for reprints should be directed to the author of the article or to the journal in which it was published. Addresses of these journals appear in the back pages of COMMERCIAL FISHERIES ABSTRACTS about once a year.

Use of trade names in abstracts does not imply endorsement of commercial products.

Hoige Bazaar, MANGALORE-1.

0.11 CRUCIBLES OF SCIENCE

Crowther, J. G., et al.
New Scientist 41, No. 640, a 32-page insert between pp. 576 and 577 (March 13, 1969)

This feature section contains 10 articles devoted to the laboratory as a creative environment for the pursuit of science:

"The Craftsman's Contribution," by J. G. Crowther; pp. 8-9. The experimental scientific laboratory that is so essential to the development of modern science evolved from the attitudes and conditions characteristic of the European renaissance. [2 figures]

"Planned Families; or Laboratories by Design," by H. V. Wyatt; pp. 10-11. Since the design of a laboratory affects use of its space and the operating interrelations of the people who work there, the objectives of the architect and of the scientists must be reconciled.

"Running an Industrial Laboratory," by Edward Stern; pp. 11-12, 15. A modern research and development laboratory in a modern technological industry must maintain an environment conducive to the generation and evaluation of market-oriented ideas that are relevant to both existing and potential situations.

"A Laboratory in a Computer," by J. M. M. Pinkerton; pp. 15-16. Many scientists do not yet appreciate the fact that a pencil, a programming sheet, and access to a computer can complement, or even replace, conventional experiment.

(over)

 Abstracter: L. Baldwin

0.35 (0.32) o-QUINONES FORMED IN PLANT EXTRACTS. THEIR REACTIONS WITH AMINO ACIDS AND PEPTIDES

Pierpoint, W. S. (Department of Biochemistry, Rothamsted Experimental Station, Harpenden, Hertfordshire, England)
Biochemical Journal 112, No. 5, 609-616 (May 1969)

Chlorogenic acid, caffeic acid, and related o-diphenols of plant tissues are rapidly oxidized by o-diphenol oxidases in extracts of tissues. The first products are highly reactive o-quinones (suggested names are chlorogenoquinone and caffeoquinone) that normally polymerize to give complex brown products of high molecular weight. The products can also react with the proteins of plant extracts (modifying the properties of these proteins and inactivating some enzymes) and plant viruses. In the present paper, the author describes the reaction of chlorogenoquinone and caffeoquinone (produced, respectively, by the enzymic oxidation of chlorogenic acid and caffeic acid) with amino acids and simple peptides. The reactions were examined manometrically and spectrophotometrically.

The amino acids, except lysine and cysteine, react primarily through their α-amino acid groups and give red or brown products. These reactions compete with the polymerization of the quinones and are followed by secondary reactions that may absorb oxygen and give products with other colors. Lysine, through its ϵ-amino group, reacts with the o-quinones in a similar way. Cysteine, through its thiol group, reacts with the o-quinones without absorbing oxygen and gives colorless

(over)

 Abstracter: F. T. Piskur

0.31 (0.39) INTRACELLULAR MECHANISMS FOR THE DECOMPOSITION OF A LIPID PEROXIDE. I - DECOMPOSITION OF A LIPID PEROXIDE BY METAL IONS, HEME COMPOUNDS, AND NUCLEOPHILES

O'Brien, P. J. (Department of Medical Biochemistry and Pharmacology, Birmingham University, United Kingdom)
Canadian Journal of Biochemistry 47, No. 5, 485-492 (May 1969)

In this study, the author examined the decomposition of a lipid peroxide by a variety of methods in order to understand further the intracellular mechanisms for the decomposition of lipid peroxides. Information on the decomposition of lipid peroxides by metal ions and heme compounds may also contribute to an understanding of the mechanisms by which metal ion and heme compounds catalyze lipid peroxide decomposition. He chose linoleic acid hydroperoxide, a lipid peroxide, since he expected that this compound would produce a simpler range of decomposition products than would a peroxide of a more highly unsaturated fatty acid.

Two types of mechanisms for the decomposition of linoleic acid hydroperoxide were found. (1) The hydroperoxide was rapidly decomposed by certain transition metal ions, heme, and hemoprotein to a complex range of products. This decomposition was accompanied by changes in ultraviolet absorption spectra. The production of radical oxidizing species probably account for these products. (2) The hydroperoxide could be decomposed by nucleophiles, presumably in a nonradical reaction to a hydroxy acid without any change in ultraviolet spectra. The author also discusses the kinetics, the pH dependence, and the effects of metal-complexing agents, inhibitors, and hydrogen donors on the catalytic activity of the metal ions and heme compounds. [5 figures, 3 tables, 24 references]

 Abstracter: F. T. Piskur

0.35 (0.32) o-QUINONES FORMED IN PLANT EXTRACTS. THEIR REACTION WITH BOVINE SERUM ALBUMIN

Pierpoint, W. S. (Department of Biochemistry, Rothamsted Experimental Station, Harpenden, Hertfordshire, England)
Biochemical Journal 112, No. 5, 619-629 (May 1969)

This paper reports on the extension of a previous study of the reactions of chlorogenoquinone (the o-quinone formed during the oxidation of chlorogenic acid) with amino acids and peptides (Pierpoint, 1969); here its reaction with bovine serum albumin (BSA) is studied. The reactions between chlorogenoquinone and BSA depend upon the ratio of the reactants. When BSA is in excess of chlorogenoquinone, oxygen is not absorbed and the products that are produced are colorless. The reaction probably involves the thiol group of BSA. When chlorogenoquinone is in excess of BSA, oxygen is absorbed and the products are red. The red color is probably produced by the reaction of the ϵ-amino groups of the BSA, because it does not form when the protein is treated with formaldehyde, succinic anhydride, or O-methylisourea. BSA was modified by a 1.5-fold and a 5-fold excess of chlorogenoquinone and then separated by chromatography on DEAE-Sephadex A-50. The reaction of BSA modified by a 5-fold excess of chlorogenoquinone with fluorodinitrobenzene suggests that the terminal α-amino group, as well as the lysine ϵ-amino groups, are combined with chlorogenoquinone.
[7 figures, 6 tables, 23 references]

 Abstracter: F. T. Piskur

0.31 (0.39)

INTRACELLULAR MECHANISMS FOR THE DECOMPOSITION OF A LIPID PEROXIDE. II - DECOMPOSITION OF A LIPID PEROXIDE BY SUBCELLULAR FRACTIONS

O'Brien, P. J., and C. Little (Department of Biochemistry, Memorial University of Newfoundland, St. John's, Newfoundland)
Canadian Journal of Biochemistry 47, No. 5, 493-499 (May 1969)

This paper reports on a comparison of the decomposition of linoleate hydroperoxide by subcellular fractions of rat liver with decomposition of lipid peroxides by transition salts, heme compounds, and nucleophiles. The properties studied were range of products produced; the pH dependence of the reaction; and the effects of metal-complexing agents, inhibitors, and hydrogen donors. The authors conclude that the decomposition of the hydroperoxide in the liver cell was due to reaction with the intracellular nucleophile glutathione by a mechanism catalyzed by the enzyme glutathione peroxidase. In the absence of glutathione, both the mitochondrial and microsomal fractions decomposed the hydroperoxide, presumably by a radical mechanism probably involving the cytochromes. [3 figures, 2 tables, 21 references] [Abstracter: F. T. Piskur]

0.33 (3.15, 7.598)

DNA STRAND BREAKAGE IN CELLS IRRADIATED WITH X-RAYS

Dean, C. J., M. G. Ormerod, R. W. Serianni, and P. Alexander (Chester Beatty Research Institute, Belmont, Sutton, Surrey, England)
Nature 222, No. 5198, 1042-1044 (June 14, 1969)

In 1967, the senior author and others, while studying the production and repair of single-strand breaks in the DNA (deoxyribonucleic acid) of L5178Y murine lymphoma cells and Micrococcus radiodurans that had been exposed to X-rays, found that oxygen affected the efficiency of strand breakage. However, the method they used to analyze DNA sedimentation profiles gave profiles with an abnormal molecular weight distribution. This distributional anomaly led them to overestimate the computed average molecular weight. In the present report, they show that the presence of oxygen during the exposure of mammalian and bacterial cells to X-rays does not affect the efficiency of single-strand breakage of DNA; however, in bacteria it does interfere with the rejoining of DNA strands broken during irradiation. They also present a new method for analyzing DNA sedimentation profiles that gives a more precise, reliable estimate of average molecular weight than the method previously used. [3 figures, 1 table, 18 references]

[Abstracter: L. Baldwin]

0.11

"The Laboratory of the Void," by Peter Stubbs; pp. 17-19. Man's mastery of space has opened up experimental opportunities ranging from observation of the most distant parts of the universe to interpretation of the growing evidence about the nature of the earth's interior. [1 photograph]

"Islands as Ecological Laboratories," by D. R. Stoddart; pp. 20-23. The isolation and simplicity of islands make them ideal laboratories upon which the principles of ecology can be studied and controlled ecological experiments can be initiated. [3 photographs]

"Flames: Labs for High-Temperature Chemistry," by P. J. Padley; pp. 23-24. A flame--which is a gaseous, wall-less, reproducible, thermostatted, high-temperature chemical bath--is a perfect medium for the study of high-speed, high-temperature chemical reactions; the data it gives are being applied to problems in space technology, catalysis, corrosion, air pollution, and the efficient use of fuels.

"Drifting in the Arctic," by Sarah White; pp. 26-28. U.S.S.R. scientific stations set upon ice floes drifting in the Arctic Ocean are unique laboratories where unique studies impossible to be conducted elsewhere can be made of the polar regions. [5 photographs, 1 map]

"Growth of the Rent-a-Lab Trade," by David Hamilton; pp. 28-31. More and more institutions are entering the sponsored research field in which a sponsor pays for the work and gets confidential results from his hired laboratory.

"What Makes a Laboratory Tick?" by Bernard Dixon; pp. 31-32. Squalor, overcrowding, ham-handed office cleaners, obdurate storemen, and fanatical firefighters all serve to create the ideal laboratory environment for producing Nobel-Prize-winning research.

0.35

products. The peptides containing cysteine react with the o-quinones through their thiol group. Glycyl-leucine, leucylglycine, and other peptides react primarily through their α-amino group: the overall reaction resembles that of the N-terminal amino acid except that it is quicker. The secondary reactions with some peptides differ from those that occur between the o-quinones and the N-terminal amino acids. The colors produced from carnosine resemble those produced from histidine rather than those produced from ß-alanine. In the appendix to this paper, N. F. Janes discusses the nuclear-magnetic-resonance spectrum of a sulfone derivative of chlorogenoquinone. [6 figures, 1 table, 18 references]

[Abstracter: L. Baldwin]

0.321 (6.54)

MEAT AND MEAT PRODUCTS

Schut, J.
Fleischwirtschaft 49, 67 (1969)
Food Manufacture 44, No. 5, 93 (May 1969)

The deposit and binding of water in frankfurter-type sausage mixtures depends to varying degrees on the addition of water to the mixture; water is additionally bound during fat emulsification in the mixture. In real fat emulsification--that is, during the formation of protein membranes around the spheres of fat--the effect of salt-soluble meat protein is quite decisive; thus during heating, phase is very important to stabilization. Water-soluble meat proteins are available as stabilizers from the beginning of the mixing operation; in the presence of salt, they also act as emulsifiers. Exudation of meat juice from the larger pieces of meat in fine fatty mixtures obstructs emulsion. Therefore, addition to the sausage mixture of some protein that is not heat coagulable but that has a high emulsifying and stabilizing capacity--for example, milk protein--is worthwhile.

[Abstracter: L. Baldwin]

0.33 (3.337)

BLOOD AMINO ACID LEVELS AND THE COURSE OF DIGESTION IN RATS OF NATIVE AND HEAT-DAMAGED COD MUSCLE PROTEIN

Buraczewski, S., J. W. G. Porter, and A. P. Williams (Nat. Inst. Res. Dairying, Shinfield, England)
Chemical Abstracts 70, No. 7, 26795h (February 17, 1969)

A calorimeter designed to eliminate systematic errors caused by temperature gradients is described, and the theoretical assumptions underlying the design are discussed. [1 figure, 1 reference] [Abstracter: L. Baldwin]

0.113

HEAT LOSS COMPENSATED CALORIMETER

Domen, Steve D. (National Bureau of Standards, Washington, D.C. 20234)
Nature 222, No. 5198, 1061 (June 14, 1969)

0.34
(9.19)

PHOTOCHEMICAL DECOMPOSITION OF DDT BY A FREE-RADICAL MECHANISM

Mosier, A. R., W. D. Guenzi (Soil and Water Conservation Research Division, Agricultural Research Service, U.S. Department of Agriculture, Fort Collins, Colorado 80521), and L. L. Miller (Chemistry Department, Colorado State University, Fort Collins)

Science 164, No. 3883, 1083-1085 (May 30, 1969)

The persistence of DDT (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) in food products, soils, waters, and the atmosphere is the result of its physical and chemical properties. For this report, the authors investigated the rate of its degradation under ultraviolet light, the identity of the degradation products, and the reaction mechanism involved in the degradation.

Of the DDT applied as thin layers on the insde walls of quartz tubing, 80 percent had decomposed after exposure to ultraviolet light (2537 Å) for 48 hr. During irradiation of DDT in a hexane solution for 1 hr., 70 percent was decomposed. The principal products identified by thin-layer chromatography from irradiation of the solid phase were DDD (1,1-dichloro-2,2-bis(p-chlorophenyl)ethane), constituting 7.7 percent of the initial activity; DDC = O (4,4'-dichlorobenzophenone), constituting 7.2 percent; DDE (1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene), constituting 7.8 percent; DDA (bis(p-chlorophenyl)ethanoic acid), constituting 4.4 percent; and BA (p-chlorobenzoic acid), constituting 3.8 percent. Products identified by gas-liquid chromatography of irradiated solutions of DDT in hexane were DDD and HCl. From the identity of these products, the estimates of

(over)

 Abstracter: L. Baldwin

0.5
(2.05)

SEROLOGICAL STUDIES OF CLOSTRIDIUM BOTULINUM TYPE E AND RELATED ORGANISMS. II. SEROLOGY OF SPORES

Solomon, H. M., R. K. Lynt, Jr., D. A. Kautter, and T. Lilly, Jr. (Division of Microbiology, Food and Drug Administration, Washington, D.C. 20204)

Journal of Bacteriology 98, No. 2, 407-414 (May 1969)

The narrow range of specificity of flagellar antigens makes using them to distinguish Clostridium botulinum type E from other botulinum types or other Clostridium species impractical. On the other hand, the excessively broad spectrum of somatic antigens makes using them to distinguish between toxigenic type E botulinum and nontoxigenic strains impossible. Because spore antigens are distinct from those of the vegetative cell and have been used to identify and classify both aerobic and anaerobic spore-forming bacteria, the authors undertook to determine whether spore antigens could be used to distinguish toxigenic C. botulinum type E from culturally identical nontoxigenic strains. They also attempted to assess the relation of type E to nontoxigenic atypical strains, to other types of C. botulinum, and to other species of Clostridium.

Pure spore antigens injected into New Zealand white rabbits gave spore antisera to strains representative of toxigenic C. botulinum type E, nontoxigenic boticin E-producing variants, nontoxigenic nonproducers of boticin E, nontoxigenic atypical strains that differ somewhat from type E in physiology, C. botulinum type A and type B, and C. bifermentans. All the spore antisera were tested

(over)

 Abstracter: L. Baldwin

0.38
(3.2494)

LOW TEMPERATURE AS AN ENVIRONMENTAL STRESS ON MICROBIAL ENZYMES

Cowman, R. A., and M. L. Speck (Department of Food Science, North Carolina State University, Raleigh 27607)

Cryobiology 5, No. 5, 291-299 (March-April 1969) (Cryobiology, Suite 308, 11125 Rockville Pike, Rockville, Maryland 20852)

Although low temperatures are recognized as a factor in the long-term preservation of biological systems, information about the adverse effects of low-temperature storage on microbial populations is relatively limited. But, since microorganisms are used as starter cultures in many food processes, they must be preserved in such a way that their maximum biological activity is retained. To this end, the authors examined the acid-producing ability of stored cells, their viability during storage, their proteinase activity, and the effect of various pH's and low temperatures on overall cellular functions.

The ability of Streptococcus lactis cells stored at 3° C. to produce acid decreased as storage time increased; yet during the storage interval, their viability remained essentially constant. After 3 days' storage, the culture showed only about 60 percent of its original proteolytic activity. Continued storage decreased the activity further. At -20° C., the viability of S. lactis Strain 3 (the most resistant of the several cultures tested) decreased markedly; only a low percentage of the cells survived 60 days of storage. The ability to produce acid was impaired, as was proteinase activity, which decreased to 21 percent of its original level during the first 3 days of storage; the activity remained relatively constant thereafter. Cells stored at -196° C. for up to 60 days survived

(over)

 Abstracter: L. Baldwin

0.5

CHEMICAL STATES OF BACTERIAL SPORES: DRY-HEAT RESISTANCE

Alderton, Gordon, and Neva Snell (Western Regional Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Albany, California 94710)

Applied Microbiology 17, No. 5, 745-749 (May 1969)

In this report, the authors show that mature bacterial spores can be manipulated by chemical pretreatments between a state sensitive to dry heat and a state resistant to dry heat. Spores of Bacillus stearothermophilus were used for the tests. One preparation of the sensitive state and three preparations of the resistant state of the spores were used in the study.

The two forms of the spore differed in their resistance to dry heat by about one order of magnitude (10-fold). Survival curves (log of number of bacteria per gram versus time of heating) for each form of the spores were approximately straight lines. The difference in resistance to dry-heat between the two forms of the spores is less than the difference in resistance to aqueous-heat.

The authors developed a method for testing resistance of psores to dry heat that minimizes interference from three sources: (1) change of chemical state of the spores during the test, (2) effect of water vapor activity on the dry-heat resistance of the spores, and (3) incomplete recovery of the spores from the test container and the clumping of spores.

(over)

 Abstracter: F. T. Piskur

Mossel, D. A. A.
Alimenta 8, 8 (1969)
Food Manufacture 44, No. 5, 94 (May 1969)

Since the usual purpose of heat-resistance tests is to evaluate potential resistance of similar populations elsewhere, the author suggests that spore samples should be manipulated chemically into each state before testing their heat resistance. [3 figures, 2 tables, 12 references]

0.5

The author surveys about 370 literature references dealing with the ecological factors influencing the growth of pathogenic bacteria in foods. After a general consideration of growth curves, he discusses intrinsic, extrinsic, and implicit growth parameters; the antagonism between pathogenic bacteria and the microorganisms that cause spoilage; the synergistic effects of other microbes; and the associations of bacteria that occur in the most important types of food. He describes the inhibition of microbial growth by unifactorial and multifactorial effects and recommends practical steps to be taken during the processing of foods.
[Abstracter: L. Baldwin]

0.38

in significantly greater numbers than those stored at -20° C. Moreover, they showed no loss in proteolytic activity or ability to produce acid.

Upon being centrifuged, cells ruptured by sonic vibrations yielded enzymatically active soluble and particulate fractions. The activity in the particulate fraction was reduced about 65 percent after 4 days' storage at 3° C., whereas the soluble fraction remained fully active. Addition of p-hydroxymercuribenzoate (PHMB) did not affect the activity of either whole cells or the particulate fraction, but inhibition of the activity of the soluble fraction increased as the concentration of PHMB was increased. From these and other findings, the authors tentatively concluded that at least two enzymes were involved in the proteinase activity.

The many different differences in the two proteinases led the authors to conclude that each has a different biological function. The membrane proteinase, because of its location, probably hydrolyzes casein to peptide fragments, which are then transported into the cell. The intracellular proteinase degrades the incorporated peptides so the cell can use them. The stability of the intracellular proteinase to storage may serve a protective function--it may exist in the cell in a monomer-dimer equilibrium, with the isolated enzyme remaining active. Thus, after storage, when the cells are subcultured at 22° C., growth can resume. However, if the enzyme is stored long enough to cause formation of the inactive trimer, severe cell damage may result. The welfare of the cell, then, depends on the ability of the intracellular proteinase to use the nitrogenous materials furnished either by the membrane proteinase or from some exogenous source.

Since the effects of low temperature as an environmental stress on microbial enzymes may be minimal (at -196° C.), severe (at -20° C.), or subtle (at 3° C.), the authors plan to expand the studies reported here.
[8 figures, 5 tables, 23 references]

0.34

quantum yield for the disappearance of DDT, the results of scavenger experiments, and the evidence of other chemical tests, the authors suggest that the photochemical degradation of DDT proceeds by a nonchain, free-radical mechanism.
[1 table, 8 references]

0.12 (3.333, 7.8) SALMON COLOR SORTER DEVELOPED BY BCRC

Anonymous
Western Fisheries 77, No. 6, 42 (March 1969)

The British Columbia Research Council at the University of British Columbia has developed a photo-electronic color probe by which individual salmon can be sorted according to color. The installation at the cannery involves a cleated conveyor belt that carries the fresh-dressed salmon past a rotary incisor to the operator of the probe. The probe is applied briefly to the flesh of each fish. A check of 300 cans commercially processed from 20,000 sockeye and coho that had been sorted at the cannery with the device revealed an error of only 2 percent. This probe is one means of eliminating a mixture of colors that consumers are unwilling to accept in canned salmon. [Abstracter: L. Baldwin]

0.5

against the flagellar and somatic antigens of these strains, additional strains representative of these groups, and other types of C. botulinum and other species of Clostridium. They agglutinated neither the antigens nor the cellular debris prepared by ultrasonic disruption of 18-hr. broth cultures of these strains. Thus the authors determined that the spore antisera are specific for spore antigens and contain no antibody to vegetative components
[5 tables, 27 references]

0.113 AN AUTOMATIC TEMPERATURE CONTROL DEVICE

Carter, J. E., A. A. Beisang, F. F. Ahlgren, F. D. Dorman, and E. F. Gregg (Department of Minnesota Science, St. Paul 55101)
Cryobiology 5, No. 5, 343-346 (March-April 1969)

A system has been developed for controlling the temperature of biological materials so that cooling rates, storage temperatures, and thawing rates can be selected and maintained. A suitable temperature and thawing rate is drawn on a conductive, mylar-coated card, and a control device regulates the flow of liquid-nitrogen refrigerant by following the line drawn on the card. The designers have used the system with a heat exchanger to control the temperature of a liquid bath, (2) as a variable set-point refrigerator to store frozen samples of blood and sperm at selected temperatures, and (4) as a variable-rate freezer for freezing biological materials.
[Abstracter: L. Baldwin]

The main advantages of this automatic temperature-control system, according to the authors, are that it is easy to program, economical to operate, and versatile. [8 figures]

0.7 (0.39) THE EFFECTS OF VITAMIN E DEFICIENCY ON THE TOTAL FATTY ACIDS AND THE PHOSPHOLIPID FATTY ACIDS OF RAT TISSUES

Lee, D. J. W., and M. McC. Barnes (Biochemistry Department, University of Liverpool, England)
British Journal of Nutrition 23, No. 2, 289-295 (June 1969)

Because tocopherols and tocotrienols are effective in vitro antioxidants, nutritionists have assumed that their biological role is connected with this property. For example, Bieri and Prival (1966) found significant changes in the polyunsaturated fatty acids (PUFA) in the testes of rats given diets deficient in vitamin E. In the present study, the authors examined the tissues of rats given diets deficient in vitamin E to determine if changes occur generally as a sign of vitamin E deficiency.

Hooded male rats were fed a diet low in vitamin E and containing 7 percent stripped lard for periods up to 14 months. A control group of rats was given the same diet supplemented with vitamin E (1 IU/rat/day).

The results showed that there are changes in the fatty acid composition of the tissues (testis, lung, pancreas, spleen, heart, kidney, liver, brain, skeletal muscle, and small intestine) and that the changes tend to be more pronounced in the phospholipid fraction than in the tissue total lipid fatty acids. There was no consistent pattern of changes in the fatty acids of the tissues from the rats given the vitamin E deficient diet for 5, 6, or 7 months when compared with the change patterns in the fatty acids of control rats. The type of changes in

(over)

 Abstracter: F. T. Piskur

0.8 DESALTED SEAWATER FOR AGRICULTURE: IS IT ECONOMIC?

Clawson, Marion, Hans H. Landsberg, and Lyle T. Alexander (Resources for the Future, Inc., 1755 Massachusetts Avenue, N.W., Washington, D.C. 20036)
Science 164, No. 3884, 1141-1148 (June 6, 1969)

In January 1966, Kaiser Engineers and Catalytic Construction Company published a commissioned report on the feasibility of desalting sea water in Israel. In November 1968, The Oak Ridge National Laboratory produced a report on nuclear energy centers and agro-industrial complexes to be established in various arid regions of the world. Using these two reports as a point of departure, the present authors discuss the merits of proposals for supplying desalted sea water on a commercial scale to agricultural regions where rainfall is extremely low.

Among the considerations that they believe are unrealistic, or even overlooked, in the proposals are the output of a nuclear electric power-desalting plant of economic size relative to the demand for that output; the cost of capital equipment, nuclear fuel, interest, operation, and maintenance in countries where the plants would be built; a trouble-free method of drawing up sea water and disposing of hot, bitter brines; a system for conveying and storing the desalted water (including installation, operation, and maintenance of the system and pumping and preventing evaporation or percolation of the water) on a highly seasonal basis; the philosophical and social implications of imposing a highly complex, technical, agricultural system in which the very nature of the crops will be changed (possibly even calling for a return to the pre-World War II plantation economy) upon a backward, traditional agriculture.

(over)

 Abstracter: L. Baldwin

0.7 (0.39) VITAMIN E AND HEPATOTOXIC AGENTS. 1. CARBON TETRACHLORIDE AND LIPID PEROXIDATION IN THE RAT

Green, J., J. Bunyan, M. A. Cawthorne, and A. T. Diplock (Beecham Research Laboratories, Vitamins Research Station, Walton Oaks, Tadworth, Surrey, England)
British Journal of Nutrition 23, No. 2, 297-307 (June 1969)

Vitamin E is able, in addition to performing its normal nutritional role, to protect the rat against a number of hepatotoxic agents. The way in which vitamin E protects against these agents is not known. Other substances show a similar protective action. Because vitamin E and these other substances are antioxidants, the protective action may be due to their functioning as an antioxidant in vivo. The hepatotoxins, then, may possibly exert their effects by pro-oxidant activity. In the present study the authors examined the evidence of involvement of lipid peroxidation in carbon tetrachloride (CCl_4) poisoning.

The authors found that the increased production of malondialdehyde by rat liver microsomal fractions during incubation with CCl_4 is a function of the vitamin E status of the rat and of an in vitro reaction. The reaction could not be correlated with the hepatotoxic action of CCl_4. The authors sought evidence for the production of lipid peroxides by CCl_4 in the livers of vitamin E-deficient and vitamin E-supplemented rats by (1) measurement of ultraviolet spectral changes ('diene' formation) and (2) direct micro-iodimetric determination of peroxide. They found no differences in peroxide content between CCl_4-treated and control rats, nor any relation between the spectrophotometric changes in the ultraviolet region and the presence of vitamin E.

(over)

 Abstracter: F. T. Piskur

2,114 (2.1125) THE JAPANESE APPROACH TO DANISH SEINE NETTING

Anonymous
World Fishing 18, No. 6, 50-51 (June 1969)

Although the Danish seine net has been used for a long time in Europe, the basic method of handling the gear changed little until the Japanese developed special rope warps and a mechanized net-hauling system that is a complete breakaway from the original method. They are also using specialized vessels for Danish seining.

The normal pattern of setting the net and warp is quadrilateral. However, when they work rocky grounds where fish are abundant, the Japanese set the warps parallel and begin hauling immediately after the buoy is picked up. A new type of combination rope padded out with fiber beneath an outer covering of synthetic fiber permits fishing on all types of bottom. This rope is a step toward solution of the higher weight/buoyancy factor that causes the new, stronger, compound ropes to dig into the bottom. They also are fishing with boats smaller than 50 gross tons. One such vessel is the No. 5 Shinei Maru, a 65-foot, 42-ton vessel built to work at 1,300-meter depths off the northern Pacific coast of the mainland. She operates with revolutionary gear designed to handle warp and net. Installed amidships, a pair of net reels is connected to a narrow auxiliary drum that is used to haul the warp, which is then stored on large rope reels installed aft. Hauling power is 1 ton at 384 feet per minute; 8,500 feet of combination rope can be carried on either side.

(over)

 Abstracter: L. Baldwin

0.8
(9.11)

PROCESSING OF DIGITAL DATA LOGGER STD TAPES AT THE SCRIPPS INSTITUTION OF OCEANOGRAPHY AND THE BUREAU OF COMMERCIAL FISHERIES, LA JOLLA, CALIFORNIA

Jones, James H. (Scripps Institution of Oceanography, La Jolla, California 92037) U.S. Fish and Wildlife Service, Special Scientific Report-Fisheries No. 588, iii + 25 pp. (June 1969) (U.S. Department of the Interior, Bureau of Commercial Fisheries, Washington, D.C. 20240)

The development of continuous sampling STD (salinity-temperature-depth) sensors as a prime data collection tool for oceanographic cruises has necessitated the development of techniques capable of handling the data with modern digital computing equipment. This paper describes one such technique that was developed for processing STD data collected as part of the EASTROPAC Survey Program. The description assumes that the data has been digitized and recorded on IBM compatible tape in the field. The computer programs needed for processing the basic data tapes are described, and a listing of the program with subroutines is given in the Appendix. [6 figures] [Author's abstract]

[21 references]

The authors conclude that the probable value of irrigating water (as shown by analyses of areas in the Southern United States where these values have been actually determined) delivered to the farm at the time it is needed will have a realistic value of 10¢ per 1,000 gallons. They suggest that 3¢ per 1,000 gallons is a much more reasonable figure. The full and true costs of the proposed desalting projects, then, are at least one whole order of magnitude greater than the value of the water to agriculture--now and for the next 20 years.

0.8

0.7
(6.19)

DISCUSSION AND SUGGESTIONS ON THE NUTRIENT REQUIREMENTS OF THE PIG

Cunha, T. J. (Department of Animal Science, University of Florida, Gainesville) Feedstuffs 41, No. 23, 20-24 (June 7, 1969)

This paper presents and discusses the new standards for the nutrient requirements of swine. Seven tables are given from the recently published 6th revised edition of the "Nutrient Requirements of Swine" issued by the National Research Council of the National Academy of Sciences, Washington, D.C. [7 tables]

[Abstracter: F. T. Piskur]

[1 figure, 2 tables, 8 references]

fatty acid distribution depends on the length of time the rats are given a diet deficient in vitamin E.

In the phospholipids of the tissues of the rats given a diet deficient in vitamin E, the PUFA of the linoleic series (ω6) decreased, except for 20:4ω6, which acid tended to increase in some tissues. After 14 months, the percentages of all the ω6 series, including 20:4ω6, decreased considerably, and the percentages of 18:1ω9 and 20:3ω9 increased--the pattern was similar to that found in animals having essential fatty acid deficiency.

0.7

2.114

FENDING OFF BOATS

Anonymous
New Scientist 43, No. 656, 21 (July 3, 1969)

The Cambridge Fender, a fender unit developed by a British civil engineering firm and the Cambridge University Engineering Laboratories, is said to be capable of absorbing whatever impact energy may be needed for ships of any foreseeable size. Based on the plastic deformation behavior of mild steel, the fender absorbs impact energy by the twisting of a mild steel bar that has one end fixed to the dockside and the other connected to the fender impact unit. Small impacts will cause elastic twisting of the torsion bar, with no deformation resulting; greater impacts will stress the bar beyond its elastic limit and cause permanent deformation. Statistical analyses of maximum berthing impacts and of the required life of the bar can be used to govern the design of a fender unit.

A prototype installation has been successfully warding off the impact of 30,000-ton tankers for over a year now, preventing damage to the boat and the jetty. This is a small installation--the Cambridge Fender is more applicable to tankers of 100,000 tons or more. [1 figure] [Abstracter: L. Baldwin]

[5 figures]

The net used is 92 feet long in the wings; the bag is 59 feet. The sequence of hauling is as follows: both wings are wound on, one wing on the forward reel and one on the aft reel; the cod end is wound on the forward reel as the wing on the aft reel is paid out; the cod end is lifted over the reel carrying the net (the forward reel) and emptied forward; all the now empty net is wound on the forward reel; the net is wound on the after reel (to keep wing and cod end from fouling each other). The net is now ready to be shot again.

2.114

0.7
(0.39)

VITAMIN E AND HEPATOTOXIC AGENTS. 2. LIPID PEROXIDATION AND POISONING WITH OROTIC ACID, ETHANOL AND THIOACETAMIDE IN RATS

Bunyan, J., M. A. Cawthorne, A. T. Diplock, and J. Green (Beecham Research Laboratories, Vitamins Research Station, Walton Oaks, Tadworth, Surrey, England) British Journal of Nutrition 23, No. 2, 309-317 (June 1969)

Ghoshal and Recknagel (1965) found no direct evidence for the participation of lipid peroxidation in the mechanism of carbon tetrachloride (CCl_4) hepatotoxicity. Others have suggested that certain other agents are hepatotoxic because of their ability to initiate chains of free-radical catalyzed lipid peroxidation. The present paper reports on the examination of the effect of orotic acid, ethanol, and thioacetamide on rats and on the action of vitamin E.

From the correlation of evidence from the experiments with the three toxic agents, the authors suggest that it is highly unlikely that lipid peroxidation is the primary event leading to either necrosis or fatty infiltration and that the mechanisms by which certain substances may exert protective actions need to be investigated further. [5 tables, 30 references] [Abstracter: F. T. Piskur]

[1 figure, 5 tables, 26 references]

The authors also studied the effect of CCl_4 (given orally) on ATP (adenosine 5'-triphosphate) levels in rat livers and the effect of CCl_4 on the metabolism of [^{14}C] D-α-tocopherol in the rat. The results suggest that lipid peroxidation is not the primary event in CCl_4 poisoning and that CCl_4 does not increase lipid peroxidation in vivo.

0.7

2.149 (1.120)

TUNA HUNTING MAY BE UNNECESSARY

Anonymous
National Fisherman 50, No. 4, 18B (July 1969)

This article is a brief resumé of a study, "Some Potential Benefits to Commercial Fishing Through Increased Search Efficiency: A Case Study--The Tuna Industry," reported by Virgil J. Norton of the Department of Food and Resource Economics, University of Rhode Island College of Agriculture, Kingston, R.I. 02881. According to the article, copies of the report may be obtained free from the author.

The thesis of the report is that costs to the California commercial tuna-fishing fleet could be appreciably reduced if a remote sensory system installed on either a satellite or an airplane were used to guide the fleet. Search time for skipjack and yellowfin tuna currently represents about 37 percent of all costs of the fleet. If the proposed sensory system were used either for direct location of tuna concentrations or for observation of environmental conditions that characterize tuna concentrations--for example, ocean surface temperatures and salinity conditions--costs of the California purse-seine fleet could be reduced by up to $12 million annually (costs presently run about $35 million). This reduction, translated into terms of 1966-67 costs, would amount to 4¢ per pound for landed tuna; it would be possible because the tuna could be caught with two-thirds of the present crew force of 1,326 and of the present vessel fleet of 102.

(over)

 Abstracter: L. Baldwin

2.9 (1.86)

SCREENING OF TOXIC CRABS IN THE RYUKYU AND AMAMI ISLANDS

Hashimoto, Yoshiro, Shoji Konosu, and Akio Inoue (Laboratory of Marine Biochemistry, Faculty of Agriculture, The University of Tokyo, Tokyo, Japan), Toshio Saisho (Laboratory of Marine Zoology, Faculty of Fisheries, Kagoshima University, Kagoshima, Japan), and Sadayoshi Miyake (Zoological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 1, 83-87 (January 1969)

Following sporadic outbreaks of toxicosis in humans and domestic animals, the authors attempted to identify, by a screening test, the toxic species of crab causing the outbreaks. Three species--Zosimus aeneus, Platypodia granulosa, and Atergatis floridus--were found to contain a powerful neurotoxin; none of the 69 other species examined was toxic. Atergatis floridus, collected in various other areas around Japan (besides the Ryukyu Islands, where the poisonings had occurred), also contained the toxin. [1 figure, 1 table, 4 references]

 Abstracter: L. Baldwin

2.9

STUDIES ON MARINE TOXINS. XX. CIGUATERA IN THE RYUKYU AND AMAMI ISLANDS

Hashimoto, Yoshiro, Shoji Konosu, Takeshi Yasumoto, and Hisao Kamiya (Laboratory of Marine Biochemistry, Faculty of Agriculture, The University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 3, 316-326 (March 1969)

Ciguatera, which is usually a nonfatal illness brought on by ingestion of reef and semipelagic animals living in tropical and subtropical waters, is a serious problem in the South and Southwest Pacific not only because it creates public health difficulties but because it is an obstacle to the use of certain fish as a source of protein. The increasing outbreaks of poisoning attributable to fish brought into Japan from southern seas led the authors to initiate a joint research project with the group at the University of Hawaii working under the Japan-United States Cooperative Science Program. This article reports the results of the field survey they made in order to get an overall view of the general ciguatera situation in the Ryukyus and the adjacent Amamis.

Their information was derived from public health and fisheries organizations, from interviews with fishermen and people who had been poisoned, and from questionnaires distributed to organizations throughout the islands. Among the findings are the following: (1) The number of poisonings over the years is not decreasing--poisonings that have occurred since 1961 constitute about one-third the total reported during the last half century. (2) Of the 20-odd species of

(over)

 Abstracter: L. Baldwin

2.9

STUDIES ON MARINE TOXINS. XXI. OCCURRENCE OF CIGUATOXIN AND CIGUATERIN IN CIGUATOXIC FISHES IN THE RYUKYU AND AMAMI ISLAND

Hashimoto, Yoshiro, Takeshi Yasumoto, Hisao Kamiya (Laboratory of Marine Biochemistry, Faculty of Agriculture, the University of Tokyo, Bunkyo-ku, Tokyo, Japan), and Tamao Yoshida (Laboratory of Fisheries Biochemistry, Tokyo University of Fisheries, Minato-ku, Tokyo)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 3, 327-332 (March 1969)

During a field investigation of ciguatera poisoning in the Ryukyu and Amami Islands, the authors found that eight species of fishes were most frequently implicated: red snapper (Lutjanus bohar), snapper (L. monostigma), gray snapper (Lethrinus sp.), sea bass (Variola louti), grouper (Epinephelus fuscoguttatus), and three species of moray eel (Gymnothorax flavimarginatus, G. undulatus, and G. meleagris). Examinations of the toxic substances in the fishes revealed two distinct types of toxin--one, a water-soluble toxin, they designated "ciguaterin," and the other, a fat-soluble toxin, they found to be identical or closely related to the "ciguatoxin" previously characterized by scientists at the University of Hawaii. Using cats, they conducted bioassays of both toxins and determined the relative amounts of ciguaterin in the muscle, liver, and gonads of the toxic fish.

Ciguaterin from the viscera of both red snapper and sea bass and from the muscle of a moray eel caused violent vomiting within from 30 minutes to 2 hours of being administered to the cats. Following a period of lost activity, the cats

(over)

 Abstracter: L. Baldwin

2.9 (1.86) A FURTHER EXAMINATION ON THE TOXICITY OF THREE SPECIES OF XANTHID CRABS

Konosu, Shoji, Akio Inoue, Tamao Noguchi, and Yoshiro Hashimoto (Laboratory of Marine Biochemistry, Faculty of Agriculture, The University of Tokyo, Tokyo, Japan)

Bulletin of the Japanese Society of Scientific Fisheries 35, No. 1, 88-92 (January 1969)

In a previous paper (1969), the authors identified three toxic xanthids (Zosimus aeneus, Platypodia granulosa, and Atergatis floridus) that had caused outbreaks of shellfish poisoning in humans and domestic animals in the Ryukyus. Here they report the results of mouse bioassay tests conducted to determine the toxicity of various parts of the body of each of the three crabs identified.

Appendages of all three crabs were usually more toxic than cephalothoraxes. In Z. aeneus, which was more toxic than the other two species, the viscera, the exoskeleton of the cephalothorax, and the exoskeleton and muscles of the appendages contained appreciable amounts of toxin. Although no difference in toxicity was noticeable between male and female specimens, the variation between specimens from different localities was fairly distinct.

[2 figures, 1 table, 5 references] [Abstracter: L. Baldwin]

3.339 CANNERY WASTE TREATMENT. II. TREATABILITY

Agardy, Franklin J., Robert G. Spicher, and Gerald T. Orlob (San Jose State Coll., San Jose, California)
Chemical Abstracts 70, No. 12, 50295r (March 24, 1969)

2.9

recovered without evidence of further ill effects, usually within 48 hours. Ciguatoxin from the muscle of red snapper and snapper and from the liver of sea bass, on the other hand, caused paralysis and hypersalivation about 20 hours after being administered; severely affected animals died in coma within a few days.

Ciguaterin was normally not found in the muscle of snapper and red snapper, though on occasion it was found in weakly toxic amounts. The muscle of G. flavimarginatus, E. fuscoguttatus, and V. louti was frequently, though weakly, toxic. The liver of all specimens was nearly always either moderately or strongly toxic, as were the gonads of red snapper. (No detectable amount of ciguaterin has been found in either the liver or the muscle of cod, mackerel, or sea bream.)

Ciguatoxin was detected less frequently than ciguaterin--the muscle of only 3 of 34 red snappers and 8 of 23 snappers contained this toxin--though they coexisted in the muscle of snapper and the liver of red snapper. The chromatographic behavior and the pharmacological action of ciguatoxin from red snapper caught near the Ryukyu Islands and those from areas in the South Pacific were identical, suggesting the homogeneity of the toxin in this species, regardless of its regional source. The number of specimens containing ciguatoxin was very low in red snapper but fairly high in snapper. Since nearly half the ciguatera in the Ryukyus has been attributed to ingestion of red snapper, the low toxicity of this fish may have lessened peoples' precautions.

The symptoms of both patients and test animals demonstrate that ciguaterin is a less important factor in the development of ciguatera than ciguatoxin is. However, ciguaterin is still worth studying, the authors conclude, if only to help clarify the ciguatera phenomenon. [2 figures, 2 tables, 8 references]

2.149

In the study, Prof. Norton converts the reduction in search time to reductions in costs of operation, in capital investment, and in labor rather than to increases in productive harvest time, for such increases must take into account the extent of current exploitation. If, for example, a given tuna population is being exploited at or over the maximum sustainable yield, increasing the effective effort expended on this population by transferring newly available search activity to harvesting activity might lower the average catch per day or per set to such a degree that the yield would actually not increase.

2.1125 - (2.1475) CATCHING FISH BY RING NETS

Strzyżewski, W.
Technika i Gospodarka Wodna, Nos. 8-9, 297-299 (1966). 5 figures
Polish Technical Abstracts 65-66, Nos. 1-2, 387, 389, Item 10730 (1967) (In Russian and English)

The use of ring nets for catching herring and cod in the North Sea and around Iceland is discussed. A step-by-step description of the fishing process is given--detecting the fish shoals, determining the direction and amount of displacement of the shoals, blocking the path of a shoal, surrounding it, pursing the net, bringing the net aboard, and removing the fish from the net--and the equipment used during particular steps is described. The development of the ring nets used in the North Sea and around Iceland is traced, and the necessity for an analysis of the possibilities of Polish fishermen's using ring nets is suggested.

[Abstracter: L. Baldwin]

2.9

fish reported to be toxic, Lutjanus bohar (red snapper), L. monostigma (snapper), Gymnothorax spp. (moray eel), Epinephelus fuscoguttatus (grouper), and Variola louti (reef bass) were most frequently implicated; L. bohar accounted for about 40 percent of the total. (3) Sporadic outbreaks of poisoning from ingestion of coconut crab and turtles were also confirmed. (4) Outbreaks seemed to be most frequent in summer, especially in July and August; whether they are caused by an increase in toxicity in summer or by an increase in consumption due to increased summer catches is yet to be determined. (5) Since the parts of the fish eaten by the patients was consumed both cooked and raw, ciguatoxin is evidently not destroyed during cooking. (6) Since the areas investigated were at fish-landing centers and the causative fishes were eaten mostly by fishermen and their families (suggesting a short period between time of catch and time of consumption), the possibility that the poisonings were due to putrefaction may be excluded. (7) The water-soluble toxin (which induced vomiting in cats) disappeared gradually during frozen storage; the fat-soluble toxin, however, remained unchanged during frozen storage for months and could not be leached out even by washing with water.

From this last finding, the authors suggest that the practice of using toxic fish in kamaboko, where the minced meat is washed with water and mixed with a large amount of nontoxic flesh, should be regarded as risky. They recommend that the authorities concerned become aware of the actual ciguatera situation and prepare a plan for counteracting it as soon as possible.
[3 figures, 3 tables, 17 references]

3.12 COMPARATIVE EFFECTIVENESS OF ETHYLENEDIAMINETETRAACETIC ACID AND CHLORTETRACYCLINE FOR FISH PRESERVATION

Boyd, J. W., and B. A. Southcott (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver, British Columbia)
Journal of the Fisheries Research Board of Canada 25, No. 8, 1753-1758 (August 1968)

The purpose of the study was to compare the effectiveness of ethylenediaminetetraacetic acid (EDTA) and chlortetracycline (CTC) in retarding the growth of spoilage bacteria in the muscle of coho salmon (Oncorhynchus kisutch), lemon sole (Parophrys vetulus), and Pacific cod (Gadus macrocephalus) during refrigerated storage. The EDTA compounds used were disodium ethylenediaminetetraacetate (Na_2EDTA) and disodium calcium ethylenediaminetetraacetate ($Na_2CaEDTA$). The results for cod are as follows: (See table on back of card.)

The authors suggest it might be assumed from the results of the experiments that EDTA either inhibits growth of certain types of fish spoilage bacteria or affects certain bacterial extracellular enzymes associated with systems involved in the production of putrefactive compounds during spoilage. $Na_2CaEDTA$ was not effective in inhibiting growth of spoilage bacteria in cod samples stored at 4° C.; Na_2EDTA was only slightly effective. EDTA apparently enhanced the antibacterial activity of CTC.

(over)

Abstracter: F. T. Piskur

3.15 (0.38) STUDIES ON THE IRRADIATION CLEAVAGE OF TRIMETHYLAMINE OXIDE IN FISH FLESH--II. ACCELERATION OF DMA FORMATION BY ADDITION OF GADOID FISH VISCERA

Tozawa, Harumi, and Keishi Amano (Tokai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 4, 397-404 (April 1969) (In Japanese; summary, figures, and tables in English)

In the first part of this study, the authors found that the amount of dimethylamine (DMA) produced by gamma irradiation was higher in the flesh of gadoid fish than in shark or cuttlefish. Since the tissues of gadoid fish, especially the viscera, are known to contain an enzyme capable of converting trimethylamine oxide (TMAO) into DMA and formaldehyde, the authors assumed that it was involved in the extraordinarily large amount of DMA produced during irradiation. To test this assumption, they added visceral mixtures derived from various fishes to the flesh of cod, Alaska pollack, and horse mackerel (1:20) and irradiated the samples at 3.0 Mrad.

When the pyloric caeca of cod or of Alaska pollack was added to the flesh of cod, pollack, or horse mackerel or to a TMAO solution, the formation of DMA was accelerated markedly during irradiation. The addition of liver mixtures to cod and pollack flesh also accelerated the rate of DMA formation, though not as markedly. The addition of pyloric caeca of horse mackerel, skipjack, and gurnard and of carp hepatopancreas to cod flesh caused little or no acceleration;

(over)

Abstracter: L. Baldwin

3.15 (3.2491, 1.12) COLOR REGENERATION OF FROZEN TUNA MEAT BY GAMMA-RAY IRRADIATION

Yamanaka, Hideaki, and Keishi Amano (Tokai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 1, 101-108 (January 1969) (In Japanese; figures, tables, and summary in English)

Despite efforts by those who handle tuna aboard ship, the frozen meat becomes discolored--and discoloration affects the market price unfavorably. To improve the color of the frozen meat, the authors experimented with gamma-ray irradiation to convert metmyoglobin to oxymyoglobin. They found that conversion occurred in proportion to the level of the dosage used.

Although a 0.2-Mrad dose was adequate to regenerate a satisfactory color without producing off-flavors, the regenerated color was transitory, for oxymyoglobin tends to revert to metmyoglobin even at -20° C. Storage conditions that allow a sufficient supply of oxygen to reach the irradiated meat is conducive to color retention; thus oxygen-permeable materials (such as polyethylene) for packaging thinly sliced, irradiated fillets may be feasible. Changes in the components of the water-soluble protein of the tuna meat could not be detected by starch-gel electrophoresis when the meat was irradiated at levels lower than 1.0 Mrad. [8 figures, 4 tables, 2 plates, 8 references]

Abstracter: L. Baldwin

3.231 AN ENGINEER'S GUIDE TO COLD STORE PRACTICE. 16-- COLD STORE LIFTS

Herbert, R. H.
Modern Refrigeration and Air Conditioning 72, No. 853, 37-38, 40,44, 82 (April 1969)

When possible, elevators in refrigerated areas should be so located that they need not pass through any space kept at below freezing temperatures. Sometimes, however, this arrangement is not possible. The result is an accumulation of problems, the solutions to which are dealt with in this article.

If the elevator shaft is insulated, cold air rushes in every time the doors in the refrigerated area are opened; the cold air then falls to the bottom of the shaft and causes condensation and icing. If the shaft is uninsulated, the warm air brought by the cars from the unrefrigerated area condenses on cars and shaft, causing a continuous icing and dripping. The simple solution, of course, would be to provide ventilation that would permit the cold air to escape from the bottom of the shaft, thus keeping the shaft at a relatively even temperature throughout its length. But fire laws do not permit this step. Heaters are expensive and wasteful. The best answer is in the use of strategically placed, and vented, fans to remove the cold air. The fan can be placed in any convenient position in the shaft just so the suction is ducted to the bottom of the pit, where the cold air settles, and the intake air is drawn from somewhere above the topmost refrigerated level. The fan need not be large--if it can change the air in the shaft about 20 times an hour, it is large enough.

(over)

Abstracter: L. Baldwin

3.15 (8.8, 7.593)

STUDIES ON THE IRRADIATION CLEAVAGE OF TRIMETHYLAMINE OXIDE IN FISH FLESH--I. DECOMPOSITION PRODUCTS FOUND IN SEVERAL FISHES

Tozawa, Harumi, and Keishi Amano (Tokai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 4, 391-396 (April 1969) (In Japanese; summary, figures, and tables in English)

The flesh of cod, Alaska pollack, shark, and cuttlefish contains a high concentration of trimethylamine oxide (TMAO), a specific constituent in marine fishes. To see how the TMAO would break down and if it would adversely affect the quality of the flesh, the authors subjected the flesh of these fish to gamma irradiation at doses ranging from 0.6 to 5.6 Mrad.

After irradiation, trimethylamine (TMA), dimethylamine (DMA), and formaldehyde (FA) were identified in all samples of the fish flesh and in irradiated solutions of TMAO as well; an increased amount of ammonia was detected in the flesh, but little was noted in the TMAO solution. Irradiation produced little difference in the quantity of TMA in the flesh of different fishes, but it produced a larger amount of DMA in the flesh of gadoid fish than in shark or cuttlefish. In addition, it caused a marked difference in the DMA levels of flesh from two Alaska pollacks irradiated at the same dosage; the amount of DMA in the flesh of one of the pollacks was much larger, even, than the amount produced from pure TMAO solution irradiated under identical conditions. Although the precursor of FA formed by irradiation of fish flesh would not be limited to TMAO, a relatively large amount of free FA recovered from the irradiated flesh of the gadoid fishes was assumed to be derived from TMAO in the tissues. [Abstracter: L. Baldwin]

[4 figures, 4 tables, 12 references]

3.12

Test solution [1]	Characteristics of the cod samples					
	After 0 days of storage [2]		After 5 days of storage [2]		After 7 days of storage [2]	
	Bacteria ($\times 10^6$) per gram	Odor rating	Bacteria ($\times 10^6$) per gram	Odor rating	Bacteria ($\times 10^6$) per gram	Odor rating
Water	0.002	--	25.0	Off	124.0	Sour
CTC - 5 p.p.m.	--	--	0.16	Fresh	2.6	Slightly stale
$Na_2CaEDTA$ - 1 percent	--	--	26.0	Off	292.0	Putrid
$Na_2CaEDTA$ - 5 percent	--	--	16.0	Off	--	Putrid
Na_2EDTA - 1 percent	--	--	0.84	Slightly sour	90.0	Slightly sour
Na_2EDTA - 5 percent	--	--	0.75	Off	68.0	Sour
CTC - 5 p.p.m. + $Na_2CaEDTA$ - 1 percent	--	--	0.02	Fresh	0.22	Slightly off
CTC - 5 p.p.m. + $Na_2CaEDTA$ - 5 percent	--	--	0.001	Fresh	0.10	Slightly off
CTC - 5 p.p.m. + Na_2EDTA - 1 percent	--	--	0.001	Fresh	0.08	Slightly off

[1] Samples were dipped in test solution. The concentrations shown represent the concentration of each compound in the respective dip solution. The sample dipped in water was the control.
[2] Storage temperature was 4° C.

[3 tables, 10 references]

3.231

The author points out problems and danger areas associated with the electrical equipment, the construction and operating system of the cars, and the contract speed (the maximum running time) of the cars relative to the open-gate-to-open-gate time. He suggests ways of circumventing or solving these problems.
[4 figures]

[Abstracter: L. Baldwin]

Reuter, H., and G. Heinz
Fleischwirtschaft 49, 169 (1969)

3.15

therefore these tissues were assumed to have little or none of the enzyme activity involved in the formation of DMA from TMAO.

No acceleration occurred when the pyloric caeca was heated for 15 min. at 100° C. before being added to the flesh. Nor did it occur when flesh or caeca or both were irradiated separately and then mixed without further irradiation; or when neither was irradiated, either before or after being mixed. Acceleration occurred only during irradiation. This reaction pattern suggested to the authors that the acceleration effect depends on the active role of the free radicals that are generated during the irradiation process.
[8 figures, 4 tables, 5 references]

3.4 (0.12)

SMOKING

Food Manufacture 44, No. 5, 64 (May 1969)

A generator has been constructed that makes a vapor smoke by means of steam superheated to temperatures of between 280° and 380° C. The apparatus produces smoke of constant quality only if 3,4-benzpyrene. Not only does the device require less smoking time than do those processes in which meat is smoked in contact with burning wood, but the products do not possess the satisfactory aroma and surface color.

[Abstracter: L. Baldwin]

3.231

GAS SEEMS A FUTURE IN AIR CONDITIONING

Modern Refrigeration and Air Conditioning 72, No. 853, 45, 47-48 (April 1969)

Ford, E.

The basis of the gas industry's approach to air conditioning is the absorption refrigeration system, either directly or indirectly gas fired. The advantages of an absorption system over a compression system are as follows: the absorption system operates extremely quietly without vibration, for it has no moving parts; maintenance costs are lower; operation is completely automatic, and does not have to be transported to the site of use or stored there. These advantages may outweigh the higher capital costs of installation.

Where as a compression system is about 10; the fuel it uses is cleaner and does not have to be transported to the site of use or stored there. years, whereas that of a compression system life, it is claimed, is as high as 20 further reducing labor costs; the claimed life is as high as 20

The prospects for expansion depend on how the gas industry and the supplies and interliers of gas air-conditioning equipment can deal with such questions as: (1) What equipment will be available? (2) What are its advantages over alternative equipment? (3) What will the system cost both for capital outlay and for operation? The author couches answers to these questions on several possible answers to several questions.
[4 figures]

[Abstracter: L. Baldwin]

[1 schematic flow diagram]

3.2341 STUDY BLAST FREEZER EFFECTS ON FILLETS
(3.239)

Wood, A. L., and L. W. Regier (Halifax Laboratory, Fisheries Research Board of Canada, Halifax, Nova Scotia)
Fisheries of Canada 21, No. 12, 18-19 (June 1969)

Blast freezers are usually designed for the specific product to be frozen, but they are versatile enough to freeze fish of almost any size and shape provided less efficient freezing can be tolerated. Even packaged fillets, if they are panned and covered, will retain their shape during blast freezing. However, exact information about the freezing time and weight loss of unpackaged fish fillets and bite-sized pieces frozen in an air-blast freezer is not readily available. To assist processors in specifying realistic limits within which a given blast-freezer design could be expected to perform, the authors set up a blast tunnel in a cold room whose temperature was maintained at -17° F. Using air velocities of 350, 700, and 1,350 ft./min., they froze four sizes of haddock fillets and two sizes of haddock cubes. The results are tabulated below.

Results of tests on haddock fillets

Weight of fillets (pounds)	Air velocity (ft./min.)	Time to freeze (minutes)	Original weight lost (percent)
1/2	350	40	1.4
1	350	50	1.8
2/3	350	40-50	1.6-1.8
2/3	700	40-50	1.6-1.8
2/3	1,350	36	1.6-1.8
2-1/4	1,350	100	1.6-1.8

(over)

 Abstracter: L. Baldwin

3.30 STUDY ON GREENING OF CANNED OYSTERS
(1.81, 9.13, 7.592)

Kimura, Tomohiro (Hiroshima Pref. Fish. Exp. Sta., Ondo, Hiroshima, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 1, 67-76 (January 1969) (In Japanese; figures, tables, and summary in English)

Oysters (Crassostera gigas) from the coast near Hiroshima turn green around the digestive diverticula after they have been canned. The greening, however, is different from that caused by such pollutants as heavy metals. Since the greening appears seasonally, the author assumed a relation between the discoloration and the seasonal crops of phytoplankton upon which the oysters feed.

Solvent extracts of the oysters, their dietary phytoplankton, and their feces were examined colorimetrically, and the absorption spectra were compared. The pigments extracted from the oyster consisted of chlorophyll and carotenoids. The green pigments were of plankton origin, the total amount being dependent on the amount of chlorophyll suspended in the environmental water. The amount of green pigment deposited in the oyster's body decreased when the oyster was kept in filtered water for several days.

Because the developed gonads cover the digestive diverticula and tend to obscure the green pigmentation, the author postulates this as a second reason for the seasonal appearance and disappearance of greening. It could also account for the difference in greening between individual oysters.
[5 figures, 7 tables, 11 references]

 Abstracter: L. Baldwin

3.2495 CHANGES IN THE HISTOLOGICAL STRUCTURE AND HYDROPHILIC PROPERTIES OF FISH TISSUE DURING STORAGE IN SUBFROZEN STATE

Piskarev, A. I., and S. Basyoni (All-Union Research Institute of the Refrigeration Industry, Moscow, U.S.S.R.)
Khołodilnaja Tiechnika 46, No. 4, 37-40 (1969) (In Russian)

The influence of the rate of freezing on the histological structure of the muscles of sheatfish and on the amount of expressible fluid after thawing was investigated. Gutted fish were used in the experiments. Rapid freezing was accomplished in 55 min. in a freezing tunnel, the air temperature being -35° C., and the velocity 6 m./sec. The temperature in the center of the fish decreased to 0.5° and at the surface to -10° C. After 130 min. in a storeroom at -2° C., the temperature in the fish reached that of the surrounding air. During moderate freezing in still air at -10° C., the temperature of the center dropped to 0.5° C. in 24 hr. Slow freezing was carried out in still air at -6° to -7° C., and after 24 hr. the temperature of the air was increased to -2° C. The fish reached that temperature after 3 days.

The histological structure of fish superchilled rapidly to -2° C. was similar to that of fast frozen fish muscle, and the sarcolemma of the muscle fibers was not ruptured. Muscles of fish superchilled at lower rates contained large ice crystals, and the histological structure was disturbed. Storage of the superchilled fish did not influence the structure of the muscles.

(over)

 Abstracter: Z. E. Sikorski

4.11 E.S.R. STUDIES OF NITROXIDE PROBES IN LECITHIN-WATER SYSTEMS

Barratt, M. D., D. K. Green, and D. Chapman (Unilever Research Laboratory, The Frythe, Welwyn, Hertfordshire, England)
Chemistry and Physics of Lipids 3, No. 2, 140-144 (April 1969)

In 1967, Waggoner et al. reported that the e.s.r. (electron spin resonance) spectra of nitroxide probes are useful for obtaining information about molecular motion for micelles of sodium lauryl sulfate. In 1968, Hubbell et al. reported these probes are useful for obtaining such information for the hydrophobic regions of nerve and muscle membranes. The present authors describe a study made of the tumbling of a nitroxide probe in lecithin and lecithin-water systems and the effect of adding cholesterol to the systems.

In the lecithin-water system, the motion of the probe decreased significantly on crystallization of the hydrocarbon chains. At temperatures above the chain-melting point, an increase in water content (up to about 25 percent water) produced an increase in the tumbling rate of the probe; at higher water contents, the motion of the probe remained relatively constant. Adding cholesterol to the lecithin-water system decreased both the motion of the probe and its solubility in the lipid.

The authors conclude that, although nitroxide probes will give useful information about the molecular motion of lipid systems, quantitative conclusions drawn from the information will be tentative because of the uncertain location

(over)

 Abstracter: L. Baldwin

3.2495

The histological structure of all samples of thawed fish was different than that of fresh muscle. The damage to the structure was especially significant in samples of slowly superchilled fish. The amount of drip from fish stored at -2° C. during 10 days increased twofold and that of fish stored 35 days increased 2.5 times. [7 references]

[Abstracter: Z. E. Sikorski]

4.13 (1.82)

STUDIES ON THE LIPIDS OF JAPANESE LITTLENECK, TAPES JAPONICA DESHAYES. III. ON THE CERAMIDE 2-AMINOETHYLPHOSPHONATE

Yasuda, Shigejirō (Department of General Education, Hiroshima University, Higashisenda-machi, Hiroshima-shi, Japan)
Journal of Japan Oil Chemists' Society 18, No. 5, 19-21 (May 1969) (In Japanese; figures, tables, and summary in English)

The author has found a sphingosine-containing lipid, identified as ceramide 2-aminoethylphosphonate, in the acetone-insoluble lipids of Japanese littleneck clam. This sphingolipid was obtained from the ether-insoluble fraction of the acetone-insoluble lipids by mild alkaline hydrolysis. Hydrolysis with methanolic hydrochloric acid confirmed the presence of 2-aminoethylphosphonic acid. The sphingosine was of the erythro form. The fatty acid composition was determined by gas-liquid chromatography; by fat the greatest percentage of these acids was palmitic (87 percent). [3 figures, 1 table, 9 references]

[Abstracter: L. Baldwin]

4.11

of the probe. Evidence during the experiments reported here suggests that the probe could be distributed between several different environments, its location being governed by the different physical states of any one sample.
[3 figures, 5 references]

3.339

EXPERIENCES OF CANNERY AND POULTRY WASTE TREATMENT OPERATIONS

Gilde, Louis C. (Campbell Soup Co., Camden, New Jersey)
Chemical Abstracts 70, No. 12, 50294q (March 24, 1969)

3.339

POULTRY PROCESSING WASTE TREATMENT AT MILLSBORO, DELMARVE

Newcome, Nelson L. (Syracuse Univ., Syracuse, New York)
Chemical Abstracts 70, No. 12, 50296s (March 24, 1969)

3.330 (3.24, 3.3343, 3.3344)

A STUDY OF PASTEURIZATION AS A MEANS OF EXTENDING THE LOW-TEMPERATURE STORAGE LIFE OF DUNGENESS CRAB AND SHRIMP

Farber, Lionel, and Peter Lerke (George Williams Hooper Foundation, California University, San Francisco)
U.S. Government Research & Development Reports 69, No. 9, 55 (May 10, 1969)

"The purpose of the study was to determine the practicality and effectiveness of pasteurization in extending the storage life of shrimp and crab meat at temperatures above freezing; to assess the potential hazards to public health arising from the procedure; and to recommend an effective heat treatment and a safe storage temperature." (Authors)

Hard copy of this report (PB-182 740) is available from the Clearinghouse for Federal Scientific and Technical Information (5285 Port Royal Road, Springfield, Virginia 22151) for $3.00; microfiche is available for $0.65.

[Abstracter: L. Baldwin]

3.2341

3.27

STEAM THAWING FOR HIGH QUALITY FISH

Anonymous
New Scientist 42, No. 652, 530 (June 5, 1969)

The quality of frozen fish can be easily impaired by rough treatment during the thawing process. Thus a thawing method recently developed by Clarke Built Ltd., of Thetford, England, assumes significance. With the method, low-temperature steam is injected into the fish-containing chamber, which has previously been pumped to partial vacuum. As the steam condenses on the frozen fish, it gives up its latent heat. The system is quick and effective even if the fish are packed in plastic, and it leaves the fish in good condition without causing loss of weight or leaching out of flavor-affecting particles.

A thawing plant with a capacity of 0.5 ton/hr. is expected to cost about £9,000. It operating costs when used with whole fish are estimated to be £2 5s per ton; with fillets, £1 9s per ton. The technique has been patented in all countries, except Peru, that have an important fishing industry.

[Abstracter: L. Baldwin]

Results of tests on bite-sized cubes

Thickness of cube (inch)	Tray area occupied (lb./sq. ft.)	Time to freeze (minutes)	Original weight lost (percent)
1/2	1.6	40	1.8
1	3.2	64	2.0

Fillets left in the freezer operating at 1,350 ft./min. for 18 hr. after being frozen lost only from 0.3 to 0.6 percent of their original weight; bite-sized pieces left in the blast 1 hr. after being frozen lost less than 0.03 percent. The authors conclude from these and the tabulated data that 1- to 2-lb. fillets will freeze in from 1 to 1.5 hr. in a -17° F. air blast moving at velocities of from 350 to 1,350 ft./min. Weight loss will vary from 1.5 to 2 percent regardless of the velocity of the blast, and most of the loss will occur before and during freezing.

The authors caution potential users of these data that the data apply to single fillets in an air-blast freezer of high freezing potential. Consequently, safety factors must be incorporated to take care of (1) the initial heavy load when room-temperature fillets are put into the freezer and (2) the increase in temperature of the air when a freezing tunnel longer than the 3-ft. one used here is employed.

4.14 SPERM WHALE HEAD OIL. PART I. THE ESTER FRACTION

Challinor, C. J., R. J. Hamilton, and K. Simpson (Department of Chemistry and Biology, Regional College of Technology, Liverpool, England)
Chemistry and Physics of Lipids 3, No. 2, 145-151 (April 1969)

In 1965, Nevenzel et al. showed that the total wax esters of the castor oil fish (Ruvettus pretiosus) are produced in a purely random way. In a study of fatty acids and their triglycerides, Gunstone (1967) pointed out that the fatty acids show specificities with respect to the position in the glycerol molecule to which they become attached. The present authors studied the esters of sperm whale oil to obtain further information about the random build-up of the saturated and the more unsaturated esters.

Separation of the head oil of sperm whale by silica gel column chromatography yielded a hydrocarbon fraction, a triglyceride fraction, and an ester fraction, the latter accounting for 76 percent of the oil. Analysis of the separated wax esters revealed that the total wax esters range from C_{25} to C_{38} in chain length and that three of the esters--C_{32}, C_{34}, and C_{36}--account for more than 60 percent of the total ester wax. Surprisingly, the proportion of esters with an odd number of carbons in the chain length was quite high--10 percent; those in castor oil fish constitute only 1.6 percent. The total wax esters were then fractionated according to their degree of unsaturation, and their composition was calculated on the assumption that they were produced in a purely random fashion.

The calculated values for the major components agreed reasonably well with the observed chromatographic results, but the observed mole percentages for the

(over)

 Abstracter: L. Baldwin

6.193 (7.642) A SHORT-TIME CHICK ASSAY FOR UNIDENTIFIED GROWTH FACTORS

Bhargava, K. K., and M. L. Sunde (Department of Poultry Science, University of Wisconsin, Madison 53706)
Poultry Science 48, No. 2, 694-697 (March 1969)

The 4-week chick assay developed by Barnett and Bird (1956) to determine the activity of unidentified growth factors in crude materials has been used extensively, with slight modifications, to measure such activity in fish meal and solubles. But lengthy tests, in addition to the time required, call for a large supply of samples, and rations can be expensive. Therefore, the authors undertook to develop a short-time assay to measure the activity of unidentified growth factors in two types of protein commonly used to supplement pure amino-acid diets fed to chicks.

Five 2-week feeding trials were conducted on 150 chicks. The 30 chicks in each trial were separated into groups of 10 and fed ad libitum one of three diets: a basal diet, about 50 percent of which was made up of an amino-acid mix; the basal diet supplemented at the 2-percent level with fish solubles (FS); and the basal diet supplemented at the 2-percent level with corn fermentation condensed solubles (CFCS). Adjustments in the amount of amino-acid mix kept all diets isonitrogenous. A table on the back of the card shows the average weight gained by the chicks, the amount of feed consumed per unit of gain for 1 week and 2 weeks, and the improvement effected by supplementing the basal diet.

(over)

 Abstracter: L. Baldwin

4.21 (8.8) STUDIES ON THE NATURE OF THE TASTE OF LIPIDS. I. INFLUENCE OF THE UNSAPONIFIABLE MATTER CONTAINED IN THERMALLY OXIDIZED SOYBEAN OIL

Usuki, Riichirō, and Takashi Kaneda (Department of Food Chemistry, Faculty of Agriculture, Tohoku University, Kita-6-Banchō, Sendai, Japan)
Journal of Japan Oil Chemists' Society 18, No. 5, 32-35 (May 1969) (In Japanese; tables and summary in English)

To determine the change in the taste of oils that is caused by heating, the authors have been fractionating the components of the heated oil, adding the fractions separately to a sample of the original oil, and testing the oil organoleptically as each fraction is added. During the present investigation, they examined the effect of adding unsaponifiable matter to the oil.

Commercial soybean oil was blown for 48 hr. with air heated to 180°±3° C., and the unsaponifiable matter separated from the oil was added to a sample of the original oil. The unsaponifiable matter affected the taste of the original oil. Although taste panelists had an impression of "blooming" or oxidized odor, they could not recognize any of the four primary tastes. The most active substance in the unsaponifiable matter was hydrocarbon; the components of the hydrocarbons in the heated oil was appreciably different from those in the unheated oil. [5 tables, 16 references]

 Abstracter: L. Baldwin

7.43 (9.19) USE OF SPINNER CULTURE CELLS TO DETECT WATER POLLUTION

Li, M. F., and Carol Jordan (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 26, No. 5, 1378-1382 (May 1969)

Fish, which are particularly susceptible to pesticides and detergents, have been used as indicators in bioassays of water pollutants. But the results of this technique, which is both laborious and time consuming, often cannot be correlated from bioassay to bioassay, for the resistance of fish to pollutants varies with the species, size, age, and physical condition of the fish. Several investigators have shown that mammalian cells cultivated in vitro are sensitive to certain pesticides in the growth medium. Therefore, using mouse fibroblast, the authors explored the possibility of detecting water pollution by means of the spinner culture technique.

Malathion, DDT, lindane, and a 2-4-D liquid weed killer were dissolved or suspended in Hanks' balanced salt solution and mixed 1:9 with growth medium to which cells in the active growth phase had been added. The growth medium was spinner medium (MEM with Hanks' base) supplemented with 10 percent fetal calf serum. To prevent cell clumping and cell damage from agitation, methylcellulose (at a concentration of 1.2 percent) and Darven (at 0.5 percent) were added. To inhibit microbial growth, 50 units/ml. of penicillin, 50 units/ml. of streptomycin, and 25 units/ml. of mycostatin were also added.

(over)

 Abstracter: L. Baldwin

4.60 ANTIOXIDATIVE PROPERTIES OF THE ALPHA-TOCOPHEROL WITH SOME AMINOACIDS

Janicki, J., M. Gogolewski, and J. Wierzbowski
Przemysł Spożywczy, No. 1, 25-26 (1968). 2 tables
Polish Technical and Economic Abstracts 72, No. 4, 77-78, Item 11960 (1968)

The authors combined alpha tocopherol with various amino acids in order to investigate (1) the possibility of the chemical binding of proteins with the hydroxyl group of the alpha tocopherol and (2) the oxidative properties of the esters obtained. They found that the degree of esterification of alpha tocopherol increases as the quantity of amino acid per 1 ml. of alpha tocopherol increases. The antioxidative properties of the esters were best at 0.01 percent concentration; at higher concentrations, the antioxidative capacity decreased. As a rule, the esters of amino acids are better antioxidants for lard than alpha tocopherol acetate is. Amino acids combined with esters of alpha tocopherol are more effective antioxidants than are the same amino acids alone.

[Abstracter: L. Baldwin]

7.43

Malathion and DDT at 25 p.p.m., lindane and 2-4-D at 5 p.p.m., and all four chemicals at 10 p.p.m. inhibited cell growth. The correlation coefficient for comparison of DDT concentration with the percentage of growth inhibition was 0.91, indicating that the regression was valid at the 1-percent level. Initial cell density of the culture also affected inhibition. Inhibition decreased as initial cell density increased--doubling the cell density reduced the inhibitory capacity of DDT (at a concentration of 50 p.p.m.) by a factor of 3.

The spinner culture technique has several characteristics that make it useful in water-pollution studies: cells can be grown luxuriantly; continuous cell growth can be studied without sacrificing the culture; assessment of cell numbers is more reliable than by use of replicate stationary cultures, where errors inevitably occur through loss of unattached cells; and the degree of growth inhibition of the cells, especially by DDT, correlates well with the concentration of the pollutant. The authors suggest that even better results could be obtained if positive controls were run with the specimens, if an optimal initial cell density were selected, and if a simpler medium were used.
[4 figures, 2 tables, 11 references]

4.14

minor components (such as C_{33} and C_{35}) were two or three times as large as the calculated values; therefore a blanket statement about the random build-up of all components would not be valid. The authors speculate that larger proportions of the odd-chain-length components may be formed to prevent the crystallization of the even-chain esters at the low temperatures to which the whale is subjected. As a whole, the saturated, monoene, and diene fractions conformed to the random distribution pattern, but the saturated C_{30} value was somewhat discrepant. These results are markedly different from the results obtained by triglyceride analyses, during which the more unsaturated fatty acids showed definite specificities. Apparently the enzymes responsible for the fatty acid and the alcohol fractions show specificities, whereas the enzymes responsible for ester condensation are multipurpose, acting on any acid or alcohol.
[1 figure, 2 tables, 4 references]

6.193

Diet	Average weight at end of 1st wk.	Average weight at end of 2nd wk.	Feed-gain ratio during 1st wk.	Feed-gain ratio during 2nd wk.	Response to supplementation: weight 1st wk.	Response to supplementation: weight 2nd wk.	Response to supplementation: feed efficiency 1st wk.	Response to supplementation: feed efficiency 2nd wk.
	grams				percent			
Basal	65.0	102.7	1.85	1.76				
Basal + 2% FS	71.1	121.3	1.71	1.58	9.4	17.9	7.6	10.2
Basal + 2% CFCS	69.1	116.2	1.71	1.64	6.3	13.2	7.6	6.8

Statistical analysis of the weight data revealed that the differences between dietary treatments were significant at the 1-percent level of probability. Average overall feed efficiency of chicks eating the supplemented diets was from 2.4 to 12.7 percent better than that of chicks eating the basal diet; these differences, too, were significant at the 1-percent level. The greater response in both weight gain and feed efficiency at 2 weeks than at 1 week is probably attributable to the presence of the yolk in the body of the day-old chicks.

Despite the greater response after 2 weeks' feeding, a 1-week assay has the advantage of time and cost over the 2-week assay--average feed consumption of 10 chicks during the first week was about 550 grams; during the second week, it was 820 grams. At 10¢ a gram for the complete diet, 10 chicks can be fed for $5.50 for 1 week and $13.70 for 2 weeks. Although a more consistent response can be obtained during a 2-week assay, quite consistent results can be obtained in 1 week from a 7.5-gram sample of dry test material.
[2 figures, 3 tables, 5 references]

4.15 HYDROCARBON-CONTAINING MARINE OILS

Warloe, Bjoern (A/S Johan C. Martenst og Co., Bergen, Norway)
Chemical Abstracts 70, No. 10, 39088e (March 10, 1969)

7.9 DETERMINATION OF THE HEAVY METAL CONTENT OF SEAFOODS BY ATOMIC ABSORPTION SPECTROPHOTOMETRY (7.74, 7.42)

Meranger, J. C., and E. Somers (Res. Lab., Dep. Nat. Health Welfare, Ottawa, Canada)
Chemical Abstracts 70, No. 13, 56326y (March 31, 1969)

4.11 CHEMICAL COMPOSITION OF FATS

Notevarp, Olav (Tech. Univ. Norway, Trondheim, Norway)
Chemical Abstracts 70, No. 8, 30303p (February 24, 1969)

4.11 MASS SPECTROMETRY IN FAT ANALYSIS

Stenhage, Einar (Univ. Göteborg, Göteborg, Sweden)
Chemical Abstracts 70, No. 8, 30300k (February 24, 1969)

FISH TECH... Library, CMFRI, COCHIN-682 018.

7.594 THE RESOLUTION OF COMPLEX TRIGLYCERIDE MIXTURES

Hammond, E. G. (Department of Dairy and Food Industry, Iowa State University, Ames 50010)
Lipids 4, No. 3, 246-249 (May 1969)

Because a number of excellent techniques for separating and analyzing triglycerides have been discovered recently, most triglyceride mixtures can be resolved into classes having the same carbon and double-bond numbers; however, only the simplest mixtures can be completely analyzed. For example, it has been shown that the wide range in molecular weight of the fatty acids in nut oils, including coconut and palm kernel oils, and their largely saturated character make opportunities for separating their mixed triglycerides very limited; moreover, straightforward application of present techniques would leave over 100 possible triglycerides unresolved. Exhaustive analysis of fish oils, with their wide range of polyunsaturated acids, clearly requires the use of radically different methods from those now being used. This article points out that a complete triglyceride analysis of these fats, and most natural fats, can be made by separating the triglyceride mixture into classes ("class" is used for glycerides having the same carbon and double-bond numbers), forming diglycerides from these classes by a method that is random with respect to the acyl groups ("group" is used for glycerides having the same carbon or double-bond numbers), separating the 1,3-diglycerides from the 1,2- plus 2,3-diglycerides, separating either the 1,3- or 1,2- plus 2,3-diglycerides into classes, and stereospecifically analyzing each of the diglyceride classes. [2 figures]

 Abstracter: L. Baldwin

7.89 (3.239) AN ASSESSMENT OF FROZEN FISH BASED ON QUALITATIVE AND QUANTITATIVE CHANGES OF THE EXPRESSIBLE DRIP AFTER THAWING

Podeszewski, Zbigniew (Dept. of Fish Technology, School of Agriculture, Szczecin, Poland)
Wyzsza Szkola Rolnicza w Szczecinie, Rozprawy No. 15, Szczecin (1969) (In Polish)

The purpose of the investigations was to determine the possibilities of exploiting the expressible tissue drip as a measure of quality of frozen fish. Baltic cod (Gadus callarias), Baltic herring (Clupea harengus membranus), pike (Esox lucius), and tench (Tinca tinca) were used in the experiments. The gutted fish were iced for periods of up to 18 days, filleted, frozen in polyethylene bags at a rate of 1.5 cm./hr., and stored at a temperature of -2.5° C. Samples of frozen fillets were taken for analysis after 2, 30, and 90 days. Protein and nonprotein nitrogen, solubility and electrophoretic mobility of the proteins, volatile basic nitrogen, trimethylamine nitrogen, and free amino acids were determined in the fresh and frozen tissue and in the expressible drip.

It was found that the essential amount of expressible drip is formed in the fresh tissue as a result of postmortem changes occurring in the protein complexes. The effect of freezing on the amount of drip is significant only in the case of prerigor fillets; in rigor and postrigor fillets it is of secondary importance. The most favorable state of freshness in which fish should be frozen for subsequent storage lasting up to 3 months at a temperature of -25° C. was found to be the state of passing the rigor mortis stage. The quantitative changes of the chemical indices of freshness used in the experiments, as determined by the drip, corresponded to those in the frozen tissue. [164 references]

 Abstracter: Z. E. Sikorski

7.81 SOME PROPERTIES OF THE FLUORESCENCE OF FISH MUSCLE

Manohar, S. V. (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba)
Journal of the Fisheries Research Board of Canada 26, No. 5, 1369-1371 (May 1969)

Wittfogel (1967) has shown that the white muscle of prerigor fish, either fresh or frozen, fluoresces under long-wavelength ultraviolet light; the white muscle of postrigor fish does not fluoresce. To examine this phenomenon more fully, the present author investigated the fluorescence of white muscle of white sucker (Catostomus commersoni) irradiated at 366 mμ under various conditions of temperature and rigor.

Muscle from prerigor fish was readily distinguishable by its fluorescence; no fluorescence appeared in muscle taken from fish postrigor. The peak of fluorescence occurred at about 460 mμ (uncorrected) for both frozen and unfrozen muscle; however, the intensity of fluorescence was always greater for the frozen muscle. The fluorescence of muscle placed in dilute solutions of distilled water, 0.05 M phosphate buffer (at pH 8.7), 0.1 N NaOH, or 0.1 M Na_2CO_3 for 15 min. at 4° C. was unaffected; that of muscle placed in 0.1 N HCl, 0.1 N H_2SO_4, and 5 percent trichloroacetic acid was completely extinguished.

Previous investigators have shown that diphosphopyridine nucleotide (DPNH) is destroyed in acids and that its fluorescence intensity is maximum at about 460 mμ. Because of the similarity between the reaction of DPNH and the fish muscle, the author subjected both prerigor and postrigor muscle to the DPNH-detection

(over)

 Abstracter: L. Baldwin

8.42 MANGANESE IN THE FRESH WATER CLAMS

Seah, T. C. M., and D. J. Hobden (Department of Biology, University of Ottawa, Ottawa 2, Canada)
Canadian Journal of Biochemistry 47, No. 5, 557-560 (May 1969)

Manganese is a regular constituent of living organisms. It is nutritionally significant for animals and plants, and recent studies have shown that it is important as an enzyme activator. Certain animals accumulate large amounts of manganese that cannot be entirely accounted for by the requirements of such systems. Previous studies by the author and others showed that in the bivalve molluscs much of the manganese is in the gill tissue and it is not readily displaced or exchanged. In the present study, the authors tried to discover more about the state of combination of the nonmetabolized manganese in the fresh-water clam (Ellipto complanatus, Solander).

They found that almost all the metabolically inactive manganese in the gill tissue of the fresh-water clam can be extracted with a 10 percent neutral solution of ethylenediaminetetraacetic acid (EDTA). The extracted manganese is in the trivalent state; inorganic pyrophosphate is also found in the extract. The authors postulate that a complex of manganipyrophosphate could account for the observed properties of the metal in vivo. [4 figures, 1 table, 25 references]

 Abstracter: F. T. Piskur

7.81

test. This test involves the reduction of a soluble tetrazolium salt (Nitro BT) by DPNH to an insoluble purple formazan dye in the presence of phenazine methosulphate (PMS). Pieces of the fish muscle were placed in an aqueous solution of Nitro BT (50 mg./100 ml.) and PMS (5 mg./100 ml.) at 25° C. for 60 min. The prerigor muscle always turned purple; the postrigor muscle remained unchanged.

Since the concentration of DPNH in fish gradually decreases for the first 4 days after the fish's death (Jones and Murray, 1966), and since the intensity of fluorescence of the white sucker muscles decreased steadily from the time of death until rigor was complete, the author suggests that DPNH is at least partly responsible for the fluorescence of fresh fish muscle. He also suggests that the capacity of prerigor muscle to react postively with Nitro BT is a valuable means of differentiating prerigor muscle from postrigor muscle in the early postmortem period. That DPNH is a more valid indicator of freshness than is lactic acid, as suggested by Wittfogel in 1967, is demonstrated.
[7 references]

7.74 ANALYSIS OF PACKAGING OIL FOR MACKEREL AND (0.31, 1.11) POSSIBLE DETERMINATION OF OIL QUALITY

Remoli, Sergio, and Bartolomeo Doro (Lab. Chim. Prov. Trieste, Trieste, Italy)
Chemical Abstracts 70, No. 13, 56363h (March 31, 1969)

7.594 (0.4) PHOSPHOLIPID COMPOSITION OF HUMAN, BOVINE AND FROG MYELIN ISOLATED ON A LARGE SCALE FROM BRAIN AND SPINAL CORD

Siakotos, A. N. (Department of Pathology, Indiana University Medical Center, Indianapolis 46207), George Rouser (Section of Lipid Research, Division of Neurosciences, City of Hope Medical Center, Duarte, California 91010), and Sidney Fleischer (Department of Molecular Biology, Vanderbilt University, Nashville, Tennessee 37203)
Lipids 4, No. 3, 239-242 (May 1969)

Myelin, long used as a model for membrane structure studies, is quantitatively reduced in several pathological states in which a knowledge of whether its composition is normal or not is essential. In their studies of the structures, including the lipid composition, of membranes from human and large animal brains, the authors needed to isolate highly purified myelin from larger quantities of tissue than researchers normally use. This report describes the large-scale isolation procedure developed for the purpose and presents phospholipid class compositions of typical myelin preparations showing that mammalian and amphibian myelins differ. [3 figures, 2 tables, 6 references]
[Abstracter: L. Baldwin]

7.51 (1.51, 6.195, 6.55) FRESH AND PRESERVED CODFISH (GADUS MORRHUA) USED AS FOOD. III. ESTIMATION OF PROTEIN QUALITY BY AMINO ACID ANALYSIS

Kalus, Brigitte, and Guenther Gebhardt (Karl-Marx-Univ., Leipzig, Germany)
Chemical Abstracts 70, No. 13, 56322u (March 31, 1969)

8.4 STUDIES ON THE MARINE MICROORGANISMS UTILIZING INORGANIC NITROGEN COMPOUNDS--IV. ON THE LIBERATION RATES OF INORGANIC NITROGEN COMPOUNDS FROM BOTTOM MUDS TO SEA WATER

Yoshida, Yoichi, and Masao Kimata (Dept. Fish., Fac. Agr., Kyoto Univ., Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 3, 303-306 (March 1969) (In Japanese; figures, table, and summary in English)

Using a core mud sampler, the authors studied the liberation rates of inorganic nitrogen compounds released from bottom mud into sea water. The rates of nitrogen compounds released from Maizuru Bay mud ranged from 0.1 to 2.0 μg. at. N/100 $cm.^2$/hr., the rate for ammonia usually being the highest; the rates of nitrogen compounds released from aquarium mud were similar, though there the rate for nitrate was the highest.
[3 figures, 1 table, 7 references] [Abstracter: L. Baldwin]

8.59 (6.54) GAS-CHROMATOGRAPHIC ANALYSIS OF AMINES IN VOLATILE SUBSTANCES OF SALMON CAVIAR

Golovnya, R. V., G. A. Mitronov, and I. L. Zhuravleva (Inst. Org.-Elem. Compds., Moscow, U.S.S.R.)
Chemical Abstracts 70, No. 7, 27745d (February 17, 1969)

7.89 (6.54) STUDIES ON FISH MEAT JELLIES (FISH SAUSAGE)--IX. RELATION BETWEEN pH OF FISH MEAT PASTE AND ELASTICITY OF FISH MEAT JELLIES

Miyake, Masato, and Akiko Tanaka (Faculty of Fisheries, Prefectural University of Mie, Tsu, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 3, 311-315 (March 1969) (In Japanese; figure, tables, and summary in English)

A simple plunger method for measuring elasticity in fish-meat jellies was devised. The method was easier to use than Miyake's gelometer method, and the values it gave correlated closely with those given by the gelometer.

Shimizu reported (1954) that the pH of salted fish-meat paste made from flying fish had an important effect on the elasticity of the jelly. The authors tested the pH required in fish-meat pastes made from dark-fleshed fishes (bluefin tuna, mackerel, and yellowtail) to ensure a properly elastic jelly; a pH of from 6.2 to 6.7 was required. In pastes made from white-fleshed fishes (flatfish, Parapristipoma trilineatum, Alaska pollack, and Japanese seabass), the pH required ranged from 7.0 to 7.5; in pastes made from horse mackerel, it ranged from 7.0 to 7.2. [1 figure, 5 tables, 5 references] [Abstracter: L. Baldwin]

6.32 FREE AMINO ACIDS AND PEPTIDES IN MARINE ALGAE

Ito, Keiji (Fac. Fish. Anim. Husb., Hiroshima Univ., Fukuyama, Hiroshima, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 1, 116-129 (January 1969) (In Japanese; tables and structural formulas in English)
[7 tables, 87 references]

8.59
(2.9)

SUR LES FRACTIONS INSAPONIFIABLES DES HOLOTHURIES STICHOPUS JAPONICUS ET HOLOTHURIA TUBULOSA [ON THE UNSAPONIFIABLE FRACTIONS OF HOLOTHURIANS STICHOPUS JAPONICUS AND HOLOTHURIA TUBULOSA]

Nomura, Tadasi, Yasuhiko Tsuchiya (Faculty of Agriculture, Tohoku University, Sendai, Japan), Daniel André, and Michel Barbier (Institut de Chimie des Substances Naturelles, C.N.R.S., 91, Gif-sur-Yvette, Essonne, France)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 3, 293-298 (March 1969) (In French; English summary)

The Holothuroidea contain substances called holothurines, whose toxicity has been known for a long time. Although several holothurines have been isolated and their chemical structures established--namely, glycosides (D-glucose, D-xylose, D-glucomethylose, 3-O-methylglucose) whose aglycone (holothurinogenin) is connected to lanosterol--uncertainty about the exact structure of the holothurinogenins remains. In this preliminary report, the authors present the results of an analysis of the unsaponifiable fractions extracted from the Japanese holothurian Stichopus japonicus and from the Mediterranean holothurian Holothuria tubulosa. The animals were found to contain mixtures of Δ-5 and Δ-7 sterols (C_{27}, C_{28}, and C_{29}); the Δ-7 series predominated. The triterpenic alcohols lanosterol (of animal origin) and cycloartenol (found in plants) were isolated in the form of their epoxide propionates. D-xylosides of C_{27}, C_{28}, and C_{29} Δ-5 sterols were also isolated and analyzed. [3 tables, 18 references]

 Abstracter: L. Baldwin

9.12

NAMES OF FISHES

Cohen, Daniel M. (Systematics Laboratory, Bureau of Commercial Fisheries, U.S. National Museum, Washington, D.C. 20560)
Commercial Fisheries Review 31, No. 5, 18-20 (May 1969)

Commercial fishermen, food processors, scientists, writers, and teachers are among the people who need to know the names of fishes. Communication about these animals is sometimes difficult because some kinds of fishes have no names, others have more than one name, and some names are used for more than one kind fish. The obvious solution would be for every species of fish to have one name that is universally recognized as referring to that species alone. This article briefly discusses some of the causes of the confusion surrounding fish names and suggests the information needed to make up suitable lists of names.

Basically fish names are of two kinds--invented and folk. Scientific names are invented and are relatively stable; however, they are not always suitable for everyday use. Some common names are also invented and may be important, as are those names used for fishes imported from foreign countries. Folk names may vary from region to region; they are deeply entrenched in the local language and are usually very descriptive. However, not only are different folk names used for one given species by people in different localities, but one given folk name may be used for different species by people in different localities.

Obviously a well-documented general list cross-indexing names that are actually used is needed. This list should tell whether the names are invented or

(over)

 Abstracter: L. Baldwin

9.13
(1.86, 1.87)

OXYGEN CONSUMPTION OF THE SPIDER CRAB (CHIONOECETES OPILIO) AND THE AMERICAN LOBSTER (HOMARUS AMERICANUS) AT A LOW TEMPERATURE

McLeese, D. W., and J. Watson (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick)
Journal of the Fisheries Research Board of Canada 25, No. 8, 1729-1732 (August 1968)

Lobsters live where water temperatures vary from -1° to +20° C. or higher; they moult, mate, lay eggs, and hatch at the intermediate and higher temperatures. In contrast, spider crabs live at water temperatures varying only from -1° to +4° C. To find out whether these crabs adapt to the lower temperatures by consuming oxygen at a higher rate than lobsters do, the authors compared their rate of oxygen consumption at about 5° C. and at various dissolved oxygen concentrations with that of lobsters.

The mean oxygen consumption for lobsters was 20.96±0.39 mg./kg./hr. at oxygen concentrations of 1.7 mg. O_2/liter and higher; the mean for crabs was 20.60±0.24 mg./kg./hr. at oxygen concentrations of 2.8 mg. O_2/liter and higher. At lower concentrations, the rate of consumption for the crabs declined with declining concentration. At higher concentrations, the routine rates of oxygen consumption for a 25-kg. group of lobsters and a 25-kg. group of crabs were identical. However, since the individual lobsters were smaller than the individual crabs (454 g. and 757 g., respectively), the mean rate of 20.96±0.39 mg./kg./hr. for 454-g. lobsters was adjusted, using a 0.88 slope of regression relating oxygen consumption to weight, to a mean rate of 18.47±0.34 mg./kg./hr. for 757-g. lobsters.

(over)

 Abstracter: L. Baldwin

9.13
(1.86)

TEMPERATURE RESISTANCE OF THE SPIDER CRAB (CHIONOECETES OPILIO)

McLeese, D. W. (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick)
Journal of the Fisheries Research Board of Canada 25, No. 8, 1733-1736 (August 1968)

Since 1965, the federal and the provincial governments of Canada have been developing a fishery for spider crab in the Gulf of St. Lawrence. After being caught, the crabs are stored live in running sea water or on ice till they can be processed. But, because their natural habitat is in waters that range in temperature between -1° and +4° C., many of them die soon after they are caught. To find out what their temperature resistance is and what temperatures are suitable for their live storage, the author measured mortality among groups of crabs kept at various temperatures in water and in moist air.

Time to 50 percent mortality of the crabs stored in water (dissolved oxygen was maintained at 8 p.p.m. and higher and salinity at a relatively constant 31-32 °/₀₀) increased from 0.07 day at 20° C. to 18.8 days at 16° C. At 12°-15° C., times to 50 percent mortality ranged from 24 to 29 days. Since, for practical purposes, crabs do not need to be stored live for more than a few days before they are processed, temperatures of between 12° and 16° C. may prove satisfactory for short-term storage; the mortality rate is 20 percent in 10 days at these temperatures. For longer term storage, the temperature of the water must be kept lower than 12° C.

(over)

 Abstracter: L. Baldwin

9.12

folk. It should describe the source of invented names and indicate the degree to which they are used, and it should give the region and degree of usage of folk names. Such a general list could be used as the basis for special lists--that is, lists that are needed for special purposes.
[2 figures, 9 references]

9.13 STUDIES ON THE MARINE MICROORGANISMS (8.4) UTILIZING INORGANIC NITROGEN COMPOUNDS--V. ON THE UPTAKE OR LIBERATION OF INORGANIC NITROGEN COMPOUNDS BY THE MICROORGANISMS AS A WHOLE IN SEA WATER (1)

Yoshida, Yoichi, and Masao Kimata (Dept. Fish., Fac. Agr., Kyoto Univ., Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 3, 307-310 (March 1969) (In Japanese; figures, table, and summary in English)

The uptake and liberation of inorganic nitrogen compounds by bacteria, phytoplankton, zooplankton, and fish living in sea water ranged from 0.01 to 0.5 µg. at. N/l./hr., the rate for ammonia being the highest. Since the rate of uptake and liberation of nitrogen by marine organisms is about 10 times the rate of supply from mud to sea water, the authors conclude that nitrogen compounds circulate mainly in the sea water itself--that the part of the nitrogen cycle that passes through bottom muds is relatively insignificant.
[2 figures, 1 table, 9 references] [Abstracter: L. Baldwin]

9.13

Time to 50 percent mortality for crabs held in moist air (at a relative humidity of between 90 and 100 percent) decreased from 8.5 days at 3° C. to 1.9 days at 13° C. Since none of the crabs held in moist air at 3° and 8° C. died within 4 days, the author concludes that live storage in cold moist air for a few days before processing is practical. [2 figures, 1 table, 6 references]

9.13 SUR LA BIOSYNTHÈSE DES STÉROLS DE L'HOLOTHURIE (2.9) STICHOPUS JAPONICUS [ON THE BIOSYNTHESIS OF STEROLS BY THE HOLOTHURIAN STICHOPUS JAPONICUS]

Nomura, Tadasi, Yasuhiko Tsuchiya (Faculty of Agriculture, Tohoku University, Sendai, Japan), Daniel Andre, and Michel Barbier (Institut de Chimie des Substances Naturelles, C.N.R.S., 91, Gif-sur-Yvette, Essonne, France)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 3, 299-302 (March 1969) (In French; English summary)

The biosynthesis of sterols, squalene, and triterpenic alcohols after an injection of acetate 1,2-^{14}C was investigated in Stichopus japonicus. The holothurian did not incorporate the acetate into the sterols or into the triterpenic alcohols; however, the squalene became radioactive following injection. From these results, the authors hypothesize that holothurians do not synthesize toxins; rather, the holothurins have an exogenous origin or they are products transformed by the animal from glycosides present in the food. [18 references]
[Abstracter: L. Baldwin]

8.8 (7.86) STUDIES ON THE BACTERIAL FLORA IN THE INTESTINES OF VARIOUS MARINE FISH

Okuzumi, Masayo, and Susumu Horie (Tokyo University of Fisheries, Konan 4, Minato-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 1, 93-100 (January 1969) (In Japanese; tables and summary in English)

To enumerate and isolate the bacteria in the intestines of nine species of fish, the authors used the smear-plate method with a modified ZoBell 2216 agar medium, 5 g. of Bacto-Peptone (Difco), 0.1 g. ferric phosphate, 30 g. agar, 750 ml. sea water, and 250 ml. distilled water. After incubation for 4 days at 20° C., the colonies developed on the plates were counted, and the representative organisms were identified.

The number of bacteria found varied from 10^4 per gram of gut content in yellowtail (Seriola aureovittata) to 10^8 per gram in frigate mackerel (Auxis thazard) and threadfin bream (Nemipterus bathybius). All 60 strains isolated were identified as Vibrio species. On the basis of their biochemical characteristics, the vibrios were divided into 10 groups; the organisms in three of the groups accounted for 77 percent of the total. Nearly all the vibrios grew well at temperatures between 25° and 37° C.; they failed to grow at 5° C. and at 42° C. All grew well in 3 percent sodium chloride and in sea water; they failed to grow in salt-free solutions. [8 tables, 16 references] [Abstracter: L. Baldwin]

9.13

This adjusted mean rate differed significantly from the mean rate for crabs, indicating that crabs have a higher routine rate of oxygen consumption than lobsters do. Moreover, the absolute difference in mean rates (only 2.2 mg./kg./hr.) suggests that an unusually high rate of oxygen consumption is the crabs' method of adapting to life at low temperatures.

The smallness of the absolute difference in rates of consumption for lobsters and crabs also suggests that the rates of water flow for live storage of unfed crabs will approximate the flows recommended by McLeese and Wilder (1964) for storing lobsters at low temperatures. However, since oxygen consumption by the crabs increased by about 50 percent when food was present, the water flow should be increased proportionally when crabs that have recently been feeding are stored.
[2 figures, 4 references]

9.14 SYNERGISM BETWEEN CYCLOPROPENOID FATTY ACIDS AND CHEMICAL CARCINOGENS IN RAINBOW TROUT (SALMO GAIRDNERI)

Lee, Donald J., J. H. Wales, J. L. Ayres, and Russell O. Sinnhuber (Oregon State Univ., Corvallis)
Chemical Abstracts 70, No. 7, 26705d (February 17, 1969)

9.16 AQUACULTURE--ITS STATUS AND POTENTIAL

Ryther, John H., and G. C. Matthiessen (Department of Biology, Woods Hole Oceanographic Institution, Woods Hole Massachusetts)
Oceanus (Feburary 1969)
National Fisherman 50, No. 3, 1C-3C, 22C (June 1969)

The yield of edible animal protein from many bays and estuaries uncultivated by man far exceeds the average yields of the offshore fishing grounds; it is equivalent to the yields of good pastureland. When man intervenes and applies the principles of husbandry to the marine environment, the difference in the yields of pastureland, offshore fishing grounds, and inshore coastal waters is enormous (see table above). To put these figures in perspective, the authors give reasons for the extraordinary yields of cultivated aquatic areas, cite the various constraints on the development of marine aquaculture, and take a look at its future.

Edible animal products

Source	Product	Yield/yr. lb./acre
Pastureland	Cattle	5-250
Offshore fishing grounds		
Continental Shelf	Groundfish	20-60
Humboldt Current	Anchovies	300
Inshore coastal farms		
Japanese	Oysters	46,000*
Spanish	Mussels	240,000*

*Not including weight of shell

The figures shown in the table for oysters and mussles are deceptive, for relatively small areas are supplied by the tides with large volumes of water; moreover, the shellfish are suspended vertically in the water column, sometimes to a depth of 95 or 100 feet. Thus, the actual surface area being used may be relatively

(over)

9.16 TWO REPORTS OFFER USEFUL INSIGHT INTO OYSTER FARMING TECHNIQUES
(1.81)

Frye, John
National Fisherman 50, No. 4, 13C, 24C (July 1969)

Two state-supported marine laboratories on Chesapeake Bay have recently issued publications on oyster farming. One, the Virginia Institute of Marine Science at Gloucester Point, Virginia, has reissued two lay publications originally printed in 1958. These reports, "Adventures of Little Oyster" and "Let's Be Oyster Farmers," and written by Robert S. Bailey and Fred C. Biggs, are popular supplements to the scientific writings of the laboratory's research workers. They contain so much new material that the reader learns about the late 1950's mainly as the period when oyster troubles started. The first of these publications, as the title suggests, was written for grade-school children. About 10,000 copies of the second have been printed; 3,000 have been sent to Virginia oystermen and a number to the Oyster Institute of North America for national distribution. It summarizes a tremendous amount of scientific information--ranging from biology, including the problem of predators and diseases, to the latest advance in culture, the cultchless spat. Its photographs are particularly striking, the reviewer says.

The other report, written primarily for internal use by scientists, is a new publication issued by the Chesapeake Biological Laboratory, Natural Resources Institute, the University of Maryland, Solomons, Maryland. This report, "Oyster Hatcheries for the Chesapeake Bay Region," by Herbert Hido, Klaus Drobeck, Elgin

(over)

9.16 CPA, OTHER SOUTHEASTERN FIRMS
SEE CATFISH AS ADJUNCT TO POULTRY INDUSTRY

Brown, Robert H.
Feedstuffs 41, No. 29, 21-23, 26 (July 19, 1969)

CPA (Cotton Producers Association, of Atlanta, Georgia, one of the largest cooperatives in the broiler business and one of the major producers of chickens and eggs) and other Southeastern firms are in the process of determining whether catfish rearing, on an integrated production and marketing basis, can be developed into the sort of cash-crop source that broilers and eggs now are. They are supplying about 80 contract farmers with fingerling stock (hatched in their own facilities) and field servicemen (who serve as working consultants). They produce their own fish feed, process the marketable fish in their own plants, and market the product (including frozen products for retail and institutional markets and individual portion-controlled packs for the restaurant trade). One firm is even planning to form a chain of restaurants to supply the take-home consumer.

The purpose of the catfish-rearing program, which is envisioned as an adjunct to, not a substitute for, the poultry industry, is to provide additional cash income for farmers. It is believed that poultrymen, with their knowledge of how to produce broilers in 7 or 8 weeks, can apply some of their knowledge to the fish business. One farmer, for example, has eight separate ponds. The largest, a 40-acre pond, was specially designed for catfish production on a commercial contract basis; five 6-acre ponds are a continuing source of cash, since the

(over)

9.16 "TSUKIISOS" AND "GYOSHOS"
A REVIEW OF ARTIFICIAL REEFS RESEARCH

Anonymous
World Fishing 18, No. 3, 62 (March 1969)

Thigmotropism, the desire of fish to be close to a solid object, is the motivating phenomenon behind the Japanese practice of building artificial "fish apartments." One type, the "tsukiiso," is built of artificial rocks or by fracturing natural reefs and rocks with explosives. This type fosters the growth of algae, sponges, tunicates, and small vertebrates; the growth and the rock jungle that supports it provide food and shelter for such commercially valuable invertebrates as abalone, sea urchin, sea cucumber, and lobster. Another type of artificial reef is the "gyosho," which is made of trees, old boats, hollow concrete blocks, and other kinds of solid and semisolid materials. This type of reef is especially conducive to increasing fish populations.

Over the past 10 years, the Japanese have invested millions of dollars in constructing artificial reefs and fish apartments. For the past 6 years, they have studied the reactions of fish to "apartments" made of various materials and in various conformations. As a result of the investigations, they have dumped thousands of concrete blocks into the sea and have been rewarded by the successful fishing that has been conducted around the blocks.

In the United States, the thigmotropism phenomenon has been studied also. In April 1960, an artificial reef of 800 16x8x8 in. concrete blocks was built

(over)

9.16

owner sells licenses to sport fishermen and charges for the fish caught in the ponds; and two small ponds are used for fingerlings.

On October 1, CPA's new processing plant will be opened. Catfish will be brought from the producers' farms in trucks, lifted into holding vats by large "truckbaskets," and kept there live until they are to be processed. From the holding vats, they go to vats where they are killed by electric shock. Their fins are then removed by electric scissors; they are skinned by machine, split open, and eviscerated with vacuum guns. Their heads are removed just before the final wash and inspection operation. Following separation into sizes, they are blast frozen and packaged. About 35 people will be employed at the plant initially.

Fish specialists predict that present methods of growing fish will eventually be outmoded. Fish will one day be mass produced, just as broilers are now. The Japanese technology of producing 900 tons of fish per acre will be adapted to conditions here--already in Pennsylvania 5 pounds of fish have been produced in a 5-gallon bottle containing only 3 pounds of water. The use of fiberglass pools will negate the time-consuming and expensive necessity of draining ponds to harvest catfish. [6 photographs]

9.16

at a depth of about 30 ft. off St. John in the Virgin Islands. In the summer of 1962, 2,754 fish of 55 species and weighing 192 lb. were removed from the reef; this poundage represents nearly 3.2 lb. per square yard of concrete block, which is equivalent to 14,514 lb. per acre of block surface. At the same time, the fish population living on the natural reef fringing St. John was extensively sampled; 1,352 fish of 103 species and weighing 211 lb. were removed from the sampling area. This poundage represents about 0.3 lb. per square yard of sampling area, or an equivalent of 1,427 lb. per acre of natural reef surface. Results from a second sampling area were almost identical--the natural reef had one-tenth the concentration of fish that the artificial reef had.

Among the information that is accumulating from these and other studies throughout the world are the following: small, low objects are best for promoting the growth of seaweed; structures with many holes and crevices are best for attracting invertebrates; higher, larger structures attract fish most effectively.

9.14 EFFECT OF DIET ON THE FATTY ACID COMPOSITION OF SALMO GAIRDNERII

Varesmaa, Eliina, Jorma J. Laine, and Fritz P. Niinivaara (Univ. Helsinki, Helsinki, Finland)
Chemical Abstracts 70, No. 7, 26837y (February 17, 1969)

9.14 EFFECTS OF TEMPERATURE ON RATE OF DIGESTION BY CHANNEL CATFISH

Shrable, John B., O. W. Tiemeier, and C. W. Deyoe (Kansas State University, Manhattan 66502)
Progressive Fish-Culturist 31, No. 3, 131-138 (July 1969)

Knowledge of the effects of different temperatures on the rate of digestion by the channel catfish (Ictalurus punctatus) can be useful to fish culturists in determining the frequency of feeding, the amount to feed, and the higher and lower temperatures at which the feeding would be advisable. This paper presents data concerning the effects of various water temperatures on rates of digestion by channel catfish and indicates optimum water temperatures for these rates.
[3 figures, 5 tables, 10 references] [Reprinted in part]

9.16

insignificant. In addition, oysters and mussels do not range in search of food, so a high percentage of what they eat is converted to flesh. And, because of the buoyant effect of water, they do not need a heavy skeletal structure, so much of their total weight is in flesh. Also, the amount of particulate matter available for food is far greater in the inshore environment than in the open sea.

Such calculations as those showing that the total annual seafood production of the United States could be doubled if one-third of Puget Sound were devoted to oyster culture are unrealistic, for they do not take into account the various constraints upon development of marine aquaculture in the United States. The availability of abundant protein foods from other sources, the lack of public demand for seafoods other than those in the luxury class (such as oysters, shrimp, lobsters), and the traditionally and legally sanctioned use of inshore waters for competitive purposes (such as recreation and waste disposal) stifle the incentive to develop coastal areas for aquaculture. To these economic, social, and legal constraints should be added the technical problems of reproducing, raising, and feeding heterogeneous species economically. The technical problems seem to be the more easily resolved.

Modern poultry production reflects the combined efforts of nutritionists, geneticists, pathologists, engineers, and scientists in a variety of other disciplines. The development of aquaculture as an efficient method of producing food depends on a similar combination of expertise. Even so, marine aquaculture is not the solution to the problem of human nutrition--it is an approach to alleviation. It offers a means of using a resource efficiently and with benefit. As a means of producing food, it requires little space and no fresh water, two qualities that dictate a concerted exploration of its potential.
[9 photographs, 1 table]

9.16

Dunnington, Willem Roosenburg, and Robert Beckett, provides the latest information on the progress at the Institute in bringing oyster production under scientific control, from spatfall to consumer, with natural hazards and variables reduced to the minimum. It discusses development of superior broodstocks, employment of the cultchless technique of setting, better ways of handling late juveniles, elimination of disease and predator problems, and cooperative research between scientists and industrymen in arriving at these goals.
[7 photographs]

9.16 (1.0156) MIXED CULTURE OF TILAPIA WITH CARP AND GRAY MULLET IN EIN HAMIFRATZ FISH PONDS

Mires, D. (Ministry of Agriculture, Extension Service, Israel)
Bamidgeh 21, No. 1, 25-32 (March 1969)

The standard method of rearing Tilapia aurea in Israel is to stock carp ponds with tilapia fingerlings a few weeks after they are hatched, usually in early June, and then harvest them at the end of October, when they reach 200-g. size. The result is that the whole production is concentrated into one quarter of the year, from October to December, and the market is without tilapia for the other three quarters. The sale of this fish the year round and the expansion of tilapia production demanded development of a new growing method. This article reports on experiments conducted to extend the growing season beyond October.

Two problems had to be solved: (1) the susceptibility of the fish to temperatures lower than 10° C. and (2) their unlimited and continuous spawning, which could easily overpopulate the ponds and retard the growth of the fish there. The first problem was solved by keeping the fish in deep ponds during the winter and adding warm water during times when frost threatened. The second problem was solved by segregating male and female fish and developing a male hybrid. Rearing 1,000 tilapia in monosexed ponds with 1,600-1,900 carp and 600 mullet gave better total yields per hectare than did rearing 1,500 tilapia with 1,600-1,900 carp only--1,377 kg./ha. versus 1,060 kg./ha. (350 kg./ha. and 410 kg./ha. for tilapia, respectively). However, 2,000-2,200 tilapia in ponds with 1,500-2,500

(over)

 Abstracter: L. Baldwin

9.16 POTENTIAL OF SODIUM SULFITE CATALYZED WITH COBALT CHLORIDE IN HARVESTING FISH

Vanderhorst, Richard, and Sue D. Lewis (Fisheries Research Laboratory and Department of Zoology, Southern Illinois University, Carbondale, Illinois 62901)
Progressive Fish-Culturist 31, No. 3, 149-154 (July 1969)

Westman and Hunter (1956) studied the feasibility of adding sodium sulfite to ponds to reduce the amount of dissolved oxygen and facilitate the selective removal of fish. They found that the chemical effectively lowered the level of oxygen. When dissolved oxygen reached 1 p.p.m. or less, the fish surfaced and could be dipped out. In the absence of a catalyst, however, the quantity of sodium sulfite required made the cost excessive.

In the present study a catalyst, cobalt chloride, was used to reduce the quantity of sodium sulfite required to lower the dissolved oxygen to a desired level.

The chemicals used in this study are not of a toxic nature and would not be expected to have any long-term effect on the fish or any adverse effect upon the environment. They do not react with any tissue or directly affect any chemical process of the fish, but simply reduce the amount of dissolved oxygen in the medium.

At current prices and at the rate used in these tests, the cost of chemicals to treat 1 acre-foot of water with sodium sulfite and a cobalt chloride catalyst

(over)

 Reprinted in part

9.19 (9.13) UPTAKE AND RETENTION OF MALATHION BY THE CARP

Bender, Michael E. (Department of Environmental Health, University of Michigan, Ann Arbor 48104)
Progressive Fish-Culturist 31, No. 3, 155-159 (July 1969)

As organophosphate insecticides are being used extensively in all phases of pest control, these compounds frequently reach the aquatic environment. This occurs most directly through spraying operations for mosquitoes, and indirectly as a result of runoff from treated land areas. Also, these compounds have been suggested for possible use in fish management, for fish eradication (Mulla et al., 1967); and mixtures of two of the phosphates--malathion and naled--have been used as a selective piscicide (Hoff and Westman, 1965).

The stated "safety" of these phosphate compounds as opposed to those of hydrocarbon origin has been based upon both acute toxicity studies and the length of persistence of the parent compound in the environment. Acute toxicity levels of the phosphate insecticides to fish have been shown by Tarzwell (1959) to be considerably lower than those of the hydrocarbons. The variable rate of hydrolysis of the phosphate compounds, however, presents several difficulties in the assumption of rapid breakdown.

The purpose of this investigation was to study the uptake and retention of one of the pesticides by the carp, Cyprinus carpio. The compound chosen for investigation was malathion, a phosphorothioate developed by the American Cyanamid Company in 1950.

(over)

 Reprinted in part

9.2 REPORT OF THE SECRETARY OF THE INTERIOR TO THE PRESIDENT AND THE CONGRESS ON THE EFFECTS OF IMPORTS ON THE UNITED STATES GROUNDFISH INDUSTRY

Anonymous
Report prepared by the Bureau of Commercial Fisheries, U.S. Department of the Interior, Washington, D.C., 84 pp. (May 1969)

This analysis of imports of groundfish is principally concerned with frozen fillets and frozen blocks of cod, cusk, haddock, hake, ocean perch, pollock, and flounder. The report covers the effects of these imports on both the Atlantic and the Pacific Coast industry from 1956 to the present. It notes declines in groundfish landings, particularly on the Atlantic Coast; in U.S. output of fillets and steaks; and in the number of fishermen catching groundfish. It sets forth the increase in U.S. production of blocks and slabs, in total and per capita consumption, in total imports, and in catching and processing costs; it relates the percent of this last increase to the lower percentage of increase in ex-vessel prices. In summary, it states that the U.S. Tariff Commission (which analyzed the import problem through 1955) found serious economic injury from imports to the U.S. groundfish industry; the present study indicates further deterioration in the industry, due in large part to rising imports.
[14 figures, 35 tables, var. references]

 Abstracter: L. Baldwin

9.16

is $3 for each part per million dissolved oxygen removed. The cost could be reduced somewhat by using less cobalt chloride. A considerable excess was used here. A judicious choice of the time for treatment could also reduce cost. A smaller quantity of chemical is needed to treat a pond early in the morning (when the dissolved oxygen level is low) than to treat the same body of water in mid-afternoon (when the oxygen level may have been increased to supersaturation by photosynthesis.

Use of sodium sulfite with a cobalt chloride catalyst for selective removal of fish appears to have some promise, particularly for channel catfish. However, its value for use in large bodies of water may be limited by a short period for live capture of the fish. Results of trial 8 indicate that it may be possible to use oxygen reduction as a means of driving fish and thus concentrating them in a smaller area for removal. Results of trial 7 indicate that manipulation of the application of chemicals may also permit better control.
[3 figures, 1 table, 2 references]

Chemical Abstracts 70, No. 7, 26659s (February 17, 1969)

Khawaja, D. K., and A. K. Jafri (Aligarh Muslim Univ., Aligarh, India)

9.13

MANGANESE ACCUMULATION AND EXCRETION BY FRESHWATER FISHES AND OTHER AQUATIC ORGANISMS

Chemical Abstracts 70, No. 7, 26674t (February 17, 1969)

Lbedeva, G. D., and G. A. Kuznetsova

(MALLAGONIA ATTU AND MASTUS SEENGHALA)

9.13

CHANGES IN THE BIOCHEMICAL COMPOSITION OF TWO COMMON CATFISHES

[Abstractor: L. Baldwin]

The prime barrier to aquaculture is not so much technical as political. Now Florida has made a breach in that barrier. It is the first state to pass a law specifically aimed at promoting experimental and commercial fish farming. Briefly, the new aquaculture law permits cruisers of the Internal Improvement Fund to lease private submerged lands for aquaculture operations. However, how the land will be used is specified in the lease, and how the farmer operates must remain open to state inspection, making this mechanism semipublic. Although these restrictions won't make aquaculture as a business any easier, the law itself is important as a precedent.

Science News 95, No. 4, 64 (July 26, 1969)

Nelson, David R.

9.3

FLORIDA LEGALIZES AQUACULTURE

9.2

ON MODELS OF COMMERCIAL FISHING

Smith, Vernon L. (University of Massachusetts)
Journal of Political Economy 77, No. 2, 181-198 (March-April 1969) (The University of Chicago Press, 5750 Ellis Avenue, Chicago, Illinois 60637)

Commercial fishing is characterized by three key economic and technological features that are relevant to the formulation of an economic theory of fish production: (1) the resource is replenishable; (2) the resource and the activity of production from it form a stock-flow relation; and (3) the harvesting process is subject to various possible external effects, such as stock externalities, mesh externalities, and crowding externalities, all of which arise fundamentally from the "common property" character of most fishery resources.

The first major section of the article, "Industry Model With Externalities," is intended to provide one example of a descriptive theory that transforms any specific pattern of assumptions about cost conditions, demand externalities, and biomass growth technology into a pattern of exploitation. The author develops and compares models for decentralized competitive exploitation of a fishery resource, exploitation by a sole owner or firm to whom an exclusive right of access has been granted, and a regulated competitive fishery.
[Abstracter: D. R. Alexander]

9.19

ANALYSIS INSTRUMENTS AID POLLUTION CONTROL

Chemical Abstracts 70, No. 12, 5026fh (March 24, 1969)

Calecti, Bernard J., F. Curtis Snowden (Leeds and Northrup Co., North Wales, Pennsylvania)

9.19

Weiss and Gakstatter (1965) have shown that the persistence of malathion in aqueous solutions is dependent on pH. The half-life of this material in solution of pH 6, 7, and 8 ranged from 3 months to 1 week. As the results of these investigators show, malathion certainly could exist in the environment long enough to permit its uptake by aquatic animals. Possible consequences from the uptake of the compound include: (1) the establishment--in edible portions of fish--of residue levels exceeding the limits established by the Food and Drug Administration for other edible meats, and (2) creation of conditions which could result in biological concentration of this compound through the food chain.

The specific objectives of this study on uptake and retention were to determine: (1) the rate of uptake of malathion from water, (2) the relative concentration of the pesticide in various tissues, (3) the differences between aqueous and oral uptake, (4) the relation between the aqueous concentration of the pesticide and the amount of uptake, and (5) the retention time of the pesticide residue.

...it seems safe to conclude that the buildup of malathion in fish from the ingestion of contaminated food is unlikely--assuming that other fish species behave in a similar manner.

These results are particularly significant in view of the slow hydrolysis of malathion in neutral or slightly acid solutions. Here the compound could persist in the environment long enough to be concentrated by fish food organisms and to create a condition which, if uptake by ingestion were significant, could lead to further biological manifestation of the compound through the food chain.
[3 figures, 5 tables, 8 references]

1.0117
(1.85) GULF OF MEXICO SHRIMP ATLAS

Osborn, Kenneth W., Bruce W. Maghan, and Shelby B. Drummond (Exploratory Fishing Base, Bureau of Commercial Fisheries, Pascagoula, Mississippi)
Bureau of Commercial Fisheries, U.S. Department of the Interior, Circular 312, 20 pp. (May 1969). Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price $2.25

The Gulf of Mexico shrimp fishery is the most valuable U.S. fishery. Its average annual U.S. landings were 207 million pounds of shrimp (tail weight) valued at $55 million to the fishermen, in the 5 years 1959-63. Three kinds of shrimp--brown, white, and pink--accounted for 98 percent of the total landings. This atlas portrays the distribution and relative catches of these three species in the U.S. offshore commercial fishery. It also gives summaries of catch and effort of the U.S. commercial fleet and the results of 15 years of exploratory shrimp fishing in the Gulf of Mexico by the Bureau of Commercial Fisheries and its predecessor, the Fish and Wildlife Service. [10 color plates, 9 graphs, 53 maps, 21 references] [Authors' Introduction]

3.34 STRUVITE FORMATION IN TUNA CANNED IN BRINE, (3.331) ESPECIALLY ITS DISTRIBUTION AND SOLUBILITY

Takahashi, Toyoo, Takeaki Kikuchi, Masakatsu Yamasawa, and Yutaka Akiyama
Chemical Abstracts 70, No. 7, 27743b (February 17, 1969)

1.89 MONOLAYERS OF CHITIN

Giles, C. H., and V. G. Agnihotri (T. Graham Young Research Laboratory, Department of Pure and Applied Chemistry, University of Strathclyde, Glasgow, C1, Scotland)
Chemistry and Industry No. 23, 754-755 (June 7, 1969)

Chitin resembles cellulose in some respects, yet it has a much greater ability to form hydrogen bonds with solutes in water. Since the authors, in 1967, were able to spread monolayers of cellulose on water, they examined in the present work the behavior of chitin as a monolayer. Using pieces of the beak of cuttlefish (Sepia officinalis), they removed the inorganic matter and the protein and analyzed the resulting material for poly-N-glucosamine; they found 46.8 percent C, 6.2 percent H, and 6.5 percent N. The source gave β-chitin whose molecular chains were apparently antiparallel, though presumably not completely separated, since they were interlocked to some extent. The β-chitin readily gave a monolayer film when it was spread from a solution in a saturated aqueous lithium thiocyanate solution prepared at 75° C.; the area per N-acetylglucosamine unit was about 40_A2 (flat orientation on the water surface, measured by Catalin models, gives from 50 to 55_A2). Solid chitin adsorbed phenol from water; in constrast, neither cellulose fibers nor monolayer films adsorb phenol from water.
[1 figure, 15 references] [Abstracter: L. Baldwin]

1.4
(9.13) HAEMATOLOGICAL STUDY OF A SPECIES OF ROCKFISH, SEBASTISCUS MARMORATUS--V. SEASONAL CHANGES OF BLOOD ELEMENTS, ELECTROPHORETIC PATTERN OF SERUM PROTEINS AND THEIR PERCENTAGE FRACTIONS

Yamashita, Hideo (Seikai Regional Fisheries Research Laboratory, Nagasaki, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 4, 379-385 (April 1969) (In Japanese; summary, figures, and tables in English)

The blood of rockfish kept in a concrete tank of circulating sea water was drawn six times throughout the year so the seasonal change of the blood elements could be determined. In both male and female fish, the specific gravity of the blood, the amount of serum protein, and the hematocrit values were highest in October and November, when spermatozoa are discharged by the male; values were lowest in February, when the female usually liberates viviparous larvae. The electrophoretic pattern of the serum protein showed five fractions, clearly separated throughout the year in female protein but not always distinct in male protein. The percentage of serum protein fractions varied with the season: component I was at the minimum and component III at the maximum in both male and female during the period when the male releases spermatozoa. The change in the amount of serum protein as well as in the percentages determined by hematocrit coincided with the development of the sex glands.
[4 figures, 2 tables, 13 references] [Abstracter: L. Baldwin]

2.5
(1.86) SHIPPING LIVE DUNGENESS CRABS BY AIR TO RETAIL MARKET

Barnett, H. J., R. W. Nelson, and P. J. Hunter (Technology Laboratory, U.S. Bureau of Commercial Fisheries, 2725 Montlake Boulvard East, Seattle, Washington 98102)
Commercial Fisheries Review 31, No. 5, 21-24 (May 1969)

Since live Dungeness crabs were first air shipped to the Hawaiian Islands about 2 years ago, sales have more than doubled. The potential market in the Midwest and the East is also good--test and commercial shipments into these areas indicate that the demand would be in excess of several million pounds a year. However, up to now a very high percentage of the crabs have died during transit; frequently the mortality was 100 percent. This article is a series of recommendations for reducing the mortality.

The successful transportation of live Dungeness crabs by air requires that the crabs be properly handled before shipment, adequately packaged, and properly handled on arrival. Only uninjured, strong crabs should be shipped. They should be packed in materials that will reduce shock and keep them cool (at 50° F. or less) and moist (at humidities of 80 percent or more). On arrival, weak crabs should be removed and cooked immediately; the remaining strong crabs should be placed live in 40° to 50° F. sea water circulating at a rate of from 10 to 15 gal. a minute. Crabs so treated can be shipped live by air to any major city in the United States with a maximum loss of 5 percent. [4 figures]
[Abstracter: L. Baldwin]

1.9 (1.0112) BILLFISHES OF THE CENTRAL PACIFIC OCEAN

Strasburg, Donald W. (Biological Laboratory, U.S. Bureau of Commercial Fisheries, Honolulu, Hawaii 96812)
U.S. Fish and Wildlife Service, Circular 311, 11 pp. (April 1969) (U.S. Department of the Interior, Bureau of Commercial Fisheries, Washington, D.C. 20240)

The word billfish is a collective term embracing the various kinds of marlin, spearfish, sailfish, and the broadbill swordfish. These large fishes, some exceeding 1,000 pounds, are found in all warm seas. Despite their size, game qualities, and commercial potential, they are poorly known biologically.

In the central Pacific, the striped and blue marlins are common or abundant; the black marlin is uncommon; the Pacific sailfish, broadbill swordfish, and shortbill spearfish are rarely caught. These fishes feed broadly on fish, squid, crustaceans, and other foods available on the high seas. In commercial catches of blue marlin in Hawaii, males and females appear in about equal numbers; but on a short-term basis, one sex can predominate. During the Hawaiian International Billfish Tournaments, which are held during the summer, more males are usually caught than females. In the commercial catch, the heaviest blue marlin (300-500 pounds) were taken in the spring, the lightest in the summer. Striped marlin show two peaks of abundance through part of the year. Blue marlin are most abundant in the summer. Striped marlin tend to occur in large numbers just when the blue marlin are least abundant. The longest migration recorded in the central Pacific was 3,000 miles, by a striped marlin that was tagged off Baja California, Mexico, later caught near the Hawaiian Islands.
[7 figures, 2 photographs, 2 tables, 1 reference] [Reprinted in part]

1.018 (1.85, 9.7) SURVEY OF PAPUA-NEW GUINEA PRAWN POTENTIAL

Anonymous
Australian Fisheries 28, No. 4, 7-8, 11-12 (April 1969)

Interests from Kuwait, Australia, New Guinea, Russia, and Norway are undertaking a series of surveys to determine the prawn-fishing potential in the waters around Papua and New Guinea. The most comprehensive of these ventures involves a joint firm, Gulf Fisheries (New Guinea) Pty. Ltd., composed of Australian interests and Gulf Fisheries of Kuwait. Not only is this firm surveying for prawns, it is training natives to fish, process the catch, handle the equipment, and conduct shore-based support operations. The Territory of Papua-New Guinea Department of Labor assists by screening applicants, equipping those selected, and negotiating wages and conditions of work. The Department of Agriculture, Stock and Fisheries is responsible for inspecting, packaging, and controlling the quality of the catch. Presently the fleet is operating with a ratio of about 10 natives to 1 European. When the operation becomes viable, up to 20 percent of the firm's capital will be offered to bona fide residents of Australia and the Territory through the Administration of Papua-New Guinea.

Shrimp fishermen from Kuwait and the U.S.S.R. are studying shrimp biology, fishing techniques, and local oceanographic conditions in the Persian Gulf to find better trawling methods; a joint Australian-Norwegian firm, using two American-built trawlers that are expected to form the nucleus of a 50-boat fleet, is conducting a combined survey-research-production operation in the Gulf of Papua; and a recently established prawn-fishing firm (composed of an earth-moving contractor and an electrician from New Guinea) is planning to build three all-steel trawlers to fish the Gulf of Papua. [6 photographs] [Abstracter: L. Baldwin]

2.117 NEW POLISH STERN TRAWLER IN PLASTICS

Madey, J.
Budownictwo Okrętowe, No. 10, 331-332 (1967). 4 figures
Polish Technical and Economic Abstracts 72, No. 4, 59-60, Item 11924 (1968)
(Centralny Instytut Informacji Naukowo-Technicznej i Ekonomicznej, Warsaw, Al. Niepodległości 188, Poland)

The first Polish stern trawler made of plastic is described. The ship is basically designed for pelagic and bottom trawling in the Baltic. She is 19.7 m. long, 5.7 m. wide, and 2.9 m. deep. Her hold capacity is 57 cubic meters, her engine power 200-235 hp., her speed 9.5-10 knots, and her range 7 days. She carries a crew of five. Among her special features are a rigid structure made of fire-resistant, polyester-glass laminate reinforced with unidirectional fabric and glass mats; channel-type longitudinal frames provided with ice-protection apparatus at the bow; four water-tight bulkheads; radio navigation and communication facilities; a pneumatic life raft capable of holding ten people; auxiliary engine, generator, pump, and compressor; refrigeration equipment; and fittings for making external electric connections while in port. The crew's quarters are above the main deck in the bow of the ship. [Abstracter: L. Baldwin]

2.8 (3.15, 0.321) IN VITRO STUDY OF MEAT AND FISH PROTEIN SENSITIVITY TO PROTEOLYTIC ENZYMES AFTER ULTRA-HIGH-FREQUENCY (UFH) HEATING

Kadaner, Ya. D., S. V. Pantyukhina, and E. I. Elovoi (Nauch-Issled. Inst. Torg. Obshchest. Pitan., Moscow, U.S.S.R.)
Chemical Abstracts 70, No. 11, 46266q (March 17, 1969)

6.54 THE EFFECT OF FISH FRESHNESS ON THE ODOUR OF FISH PROTEIN CONCENTRATE

Sikorski, Z. E., and H. Zimińska (Dept. of Fish Technology, Politechnika Gdańska, Poland)
Przemysł Spożywczy 22, No. 9, 405-406 (1968) (In Polish) (Wydawnictwo Czasopism Technicznych NOT, 3/5 Czackiego, Warsaw, Poland)

The odor of protein concentrate produced from Baltic herring by EtOH and ligroin extraction was found to increase with the refrigerated storage time of the fish prior to processing. The intensity of the remaining fish odor of the final product stored 2 months in nitrogen atmosphere in a refrigerator increased about 90 percent, as measured by the dilution index.

[Abstracter: E. Dunajski]

6.55 FEEDSTUFFS -- 1969 FEEDSTUFFS ANALYSIS TABLE

Hubbell, Charles H. (Des Plaines, Illinois)
Feedstuffs 41, No. 29, 24-25 (July 19, 1969)

The Feedstuffs Analysis Table is published annually and contains a convenient summary of the latest information on the composition of the most commonly used feed ingredients. The chart is useful to feed manufacturers and students of nutrition in formulating feeds for farm animals. [Abstracter: F. T. Piskur]

9.16 FISH BREEDING POSSIBILITIES IN THE SALT WATER OF BITUMINOUS COAL MINES

Stangenberg, M.
Gospodarka Wodna, No. 10, 390-393 (1966). 7 tables
Polish Technical Abstracts 65-66, Nos. 1-2, 377, 379, Item 10720 (1967) (In Russian and English)

The author analyzed the biological and economic feasibility of breeding fish in the reservoirs formed by water drained from coal mines. He found that the water contained less oxygen and less free dissolved carbon dioxide than most aquatic plants require for photosynthesis; therefore the food available to any fish that might be planted in these waters will be quite poor. On the other hand, the concentration of salt is so great that it far exceeds the survival threshold of carp and of most typical lake fish. As a result of these findings, he makes the following recommendations to people planning to raise fish in mine-water ponds: (1) the concentration of chlorides in the water should never exceed 5,000 mg./liter of chloride; (2) the waters should be free of excessive amounts of heavy metals; (3) efforts should be directed toward raising fish of marine origin or carp that have been selectively bred to survive in very salty water. He concludes by reminding breeders that yields will be very low because of the meagerness of a natural food supply. [Abstracter: L. Baldwin]

9.16 (1.0156) PRELIMINARY REPORT ON INDUCED SPAWNING OF M. CEPHALUS (L.) REARED IN CAPTIVITY IN FRESHWATER PONDS

Yashouv, A., E. Berner-Samsonov, and K. Karamosta (Fish Culture Research Station, Dor, Israel)
Bamidgeh 21, No. 1, 19-24 (March 1969)

Although mullet (Mugil cephalus) can be reared in fresh or brackish water, they do not spawn there. From Russian work on induced spawning in sturgeon and Indian work on carp, the authors hypothesized that mullet confined to fresh-water ponds could be forced to spawn by being treated with extracts of carp pituitary. Using 22 females and 16 males, they conducted 6 experiments with carp pituitary and with carp pituitary plus other hormone material (urine from pregnant women and pure luteinizing hormone). The amount of hypophyseal material injected was governed by the fish's weight.

The results proved that, under suitable conditions, mullet reared in fresh-water ponds will mature and ripen. Moreover, they can be induced to spawn if the proper dosage of carp pituitary glands is administered. The authors point out that these results have wider application than just to mullet, for they indicate that other valuable marine fish suitable for cultivation in fresh or brackish waters may also be induced to spawn in captivity.
[4 figures, 1 table, 6 references] [Abstracter: L. Baldwin]

9.19 BIOLOGICAL PONDS AS THE THIRD STAGE OF SEWAGE TREATMENT

Bożko, L., L. Kalisz, and T. Suchecka
Gaz, Woda i Technika Sanitarna, No. 6, 201-202 (1966). 1 figure, 2 tables
Polish Technical Abstracts 65-66, Nos. 1-2, 387, Item 10729 (1967) (In Russian and English) (Centralny Instytut Informacji Naukowo-Technicznej i Ekonomicznej Warsaw, Aleje Niepodległości 188, Poland)

Of five ponds at a municipal sewage-treatment plant, three were stocked with fish and two with Daphnia. The ponds were divided into two groups and then so connected that the water in each group would flow sequentially from pond to pond. The fish ponds were the more effective in purifying the water. The authors conclude that biological ponds can be used under various climatic conditions, both for untreated sewage and for sewage already treated biologically.
[Abstracter: L. Baldwin]

9.19 APPLICATION OF CYBERNETIC TECHNIQUES TO STUDY THE DYNAMICS OF RADIOISOTOPE ACCUMULATION BY SOME SEA ORGANISMS

Bachurin, A. A. (Inst. Biol. Yuzh. Morei im. Kovalevskogo, Sevastopol, U.S.S.R.)
Chemical Abstracts 70, No. 9, 35094f (March 9, 1969)

9.19 SOME LONG-LIVED RADIONUCLIDES IN MARINE ORGANISMS ON THE PACIFIC COAST OF JAPAN

Tsuruga, Hanato (Tokai Reg. Fish. Res. Lab., Tokyo, Japan)
Chemical Abstracts 70, No. 7, 26662n (February 17, 1969)

9.6 (9.15, 9.16) INFORMATION ON HEALTH ASPECTS OF PESTICIDES

Minter, Philip C., Wayland J. Hayes, Jr., and Gus J. Caras (Pesticides Program, Food and Drug Administration, U.S. Department of Health, Education, and Welfare, Atlanta, Georgia 30333)
Journal of Chemical Documentation 9, No. 2, 73-75 (May 1969)

About 2 years ago, a contract was let by the Pesticides Program of the Public Health Service for a study of the informational requirements of the users of a health-oriented Pesticides Information Center. The contract called for compilation of a thesaurus covering the health and medical aspects of pesticides, a limited system for selectively disseminating information, and publication of an abstract bulletin. Since the users' response to the abstract bulletin indicated a need for an abstract service, a contract was let for publication of the bulletin on a regular basis. Under the contract, about 500 journals, as well as reports and proceedings of meetings, are abstracted and published monthly in Health Aspects of Pesticides. The abstracts follow closely the format and rules established by Chemical Abstracts; annual author and subject indexes will be compiled. Future plans call for printing of abstract cards and for a computerized system of retrospective searching of the files. The bulletin is available from the Government Printing Office at an annual subscription price of $2.75.
[1 figure, 3 references] [Abstracter: L. Baldwin]

9.16 FISH FARMING HUSBANDRY:
FEEDING AND INDUCED SPAWNING

Campbell, K. C.
World Fishing 18, No. 3, 47-48 (March 1969)

The economic and biological factors that govern an economically profitable fish-farming operation are reviewed; then the measures that have been taken to induce fish to spawn in captivity are mentioned. Only if the fish can be made to breed in captivity can stocks be improved and the fry produced when and where they are needed.

Although hormone injections have produced successful results with vertebrate fish, the reproductive system of prawns has defied the efforts of fish culturists. The prawns' feeding habits have created other, so far insurmountable, problems. Until a suitable binder can be found that will prevent prawn food from disintegrating before it is eaten--or one that will be acceptable to the prawns' taste--prawn farming will lag far behind salmon, carp, eel, trout, and ayu (a Japanese fresh-water trout) farming, all of which have made great strides toward profitable returns by use of the extraordinarily efficient Oregon Pellet. By using this extruded formula feed (it has a conversion factor of 1.5), the fish farmer can produce 1 lb. of fish for a 21d food cost. [2 references]

[Abstracter: L. Baldwin]

9.19 PROGRESS IN WASTE DISPOSAL RESEARCH AND DEVELOPMENT

Fineman, Phillip
Chemical Abstracts 70, No. 12, 50262c (March 24, 1969)

9.6 SURVIVAL IN COLD WATER
(2.119)

Keatinge, W. R.
Survival in Cold Water, 131 pp. (n.d.) (Blackwell Scientific Publications: Oxford, England; Edinburgh, Scotland) Price 30s
Reviewed by Otto Edholm
New Scientist 42, No. 653, 600 (June 12, 1969)

The subtitle of this book--"The physiology and treatment of immersion hypothermia and of drowning"--describes the book's contents. Since protection from the hazards of the sea requires protection against cold as a prime consideration, this review of the research done on the effect of cold on man and animals, with special reference to the problems of survival in cold water, is of particular significance to fishermen and those who design devices ensuring safety at sea.

[Abstracter: L. Baldwin]

9.6 FOOD SCIENCE
(0.6)

Potter, Norman
Food Science, 653 pp. (n.d.) (Avi Publishing Co.) Price $16.00
Reviewed by Alan Ward
New Scientist 42, No. 646, 199 (April 24, 1969)

Drawing freely from reviews, official publications, papers, and other books, the author attempts to cover at an introductory level the elements of food composition, nutrition, the ways of processing and preserving foods, the main commodities, packaging, consumer protection, and the food needs of the world. The book could be useful to home economists, food caterers, technicians in the food industry, and others needing a background knowledge of food technology.

[Abstracter: L. Baldwin]

9.15 TOXICITY OF RHODAMINE B AND FLUORESCEIN SODIUM TO FISH AND THEIR COMPATIBILITY WITH ANTIMYCIN A

Marking, Leif L. (Fish Control Laboratory, U.S. Bureau of Sport Fisheries and Wildlife, La Crosse, Wisconsin 54601)
Progressive Fish-Culturist 31, No. 3, 139-142 (July 1969)

Because of increasing use of fluorescent dyes in conjunction with the reclamation of streams, my experiments were designed with two objectives in mind: (1) to determine the toxicity of the dyes to three common game fishes; (2) to evaluate the compatibility of the dyes with antimycin, a fish toxicant (Walker, Lennon, and Berger, 1964), and the effects of dye-toxicant combinations on fish.

Both dyes are relatively nontoxic to fish. This is especially so in shorter exposures. A field concentration of 0.1 p.p.m. of either dye would have to be increased more than 1,000 times to be toxic to rainbow trout, a more sensitive fish. Since fluorometric methods have reduced the concentrations of dyes needed in tracing water, neither dye should cause any toxicity in fish or influence significantly the activity of antimycin against the fish.

[2 tables, 10 references] [Reprinted in part]

9.19 SEWAGE, TRADE WASTES, AND RIVER POLLUTION

Jackson, S. (Water Pollut. Res. Lab., Stevenage, England)
Chemical Abstracts 70, No. 12, 50264e (March 24, 1969)

9.6 FISH PERIODICAL
(9.10)

Anonymous
Journal of Fish Biology, vol. 1, no. 1, 84 pp. (January 1969) (Academic Press: London, England)
Reviewed by K. A. Pyefinch
Nature 222, No. 5196, 903-904 (May 31, 1969)

The Journal of Fish Biology is being published quarterly for the Fisheries Society of the British Isles, an organization whose stated aims include support of all branches of fish biology and fishery sciences and dissemination of information about fishery management. The reviewer, while acknowledging that an accurate assessment of the value of the journal cannot be made on the basis of one issue, congratulates the editor and publishers on the appearance of this first issue, its well-planned layout and arrangement, the well-reproduced line diagrams and graphs, and the generous number of plates. He does bemoan the scope of this first issue--it is devoted exclusively to fresh-water fish, though papers on toxicity, aquatic weed control, and the photography of fish scales extend the applicability.

Annual subscription to the journal is 105s ($14.50).

[Abstracter: L. Baldwin]

FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

Author	Page	Code
Agardy, Franklin J.	8	3.339
Agnihotri, V. G.	23	1.89
Ahlgren, F. F.	4	0.113
Alderton, Gordon	3	0.5
Alexander, Lyle T.	5	0.8
Alexander, P.	2	0.33
Amano, Keishi	9	3.15
	9	3.15
	10	3.15
André, Daniel	17	8.59
	18	9.13
Ayres, J. L.	18	9.14
Bachurin, A. A.	25	9.19
Barbier, Michel	17	8.59
	18	9.13
Barnes, M. McC.	5	0.7
Barnett, H. J.	23	2.5
Barratt, M. D.	11	4.11
Basonyi, S.	11	3.2495
Beisang, A. A.	4	0.113
Bender, Michael E.	21	9.19
Berner-Samsonov, E.	25	9.16
Bhargava, K. K.	13	6.193
Boyd, J. W.	9	3.12
Bożko, L.	25	9.19
Brown, Robert H.	19	9.16
Bunyan, J.	5	0.7
	6	0.7
Buraczewski, S.	2	0.33
Campbell, K. C.	26	9.16
Caras, Gus J.	25	9.6
Carter, J. E.	4	0.113
Cawthorne, M. A.	5	0.7
	6	0.7
Challinor, C. J.	13	4.14
Chapman, D.	11	4.11
Clawson, Marion	5	0.8
Cohen, Daniel M.	17	9.12
Cowman, R. A.	3	0.38
Crowther, J. G.	1	0.11
Cunha, T. J.	6	0.7
Dean, C. J.	2	0.33
Deyoe, C. W.	20	9.14
Diplock, A. T.	5	0.7
	6	0.7
Domen, Steve D.	2	0.113
Dorman, F. D.	4	0.113
Doro, Bartolomeo	16	7.74
Drummond, Shelby B.	23	1.0117
Elovio, E. I.	24	2.8
Farber, Lionel	12	3.330
Fineman, Phillip	26	9.19
Fleischer, Sidney	16	7.594
Ford, E.	10	3.231
Frye, John	19	9.16
Galetti, Bernard J.	22	9.19
Gebhardt, Guenther	16	7.51
Getchell, David R.	22	9.3
Gilde, Louis C.	12	3.339
Giles, C. H.	23	1.89
Gogolewski, M.	14	4.60
Golovnya, R. V.	16	8.59
Graham, E. F.	4	0.113
Green, D. K.	11	4.11
Green, J.	5	0.7
	6	0.7
Guenzi, W. D.	3	0.34
Hamilton, R. J.	13	4.14
Hammond, E. G.	15	7.594
Hashimoto, Yoshiro	7	2.9
	7	2.9
	7	2.9
	8	2.9
Hayes, Wayland J., Jr.	25	9.6
Heinz, G.	10	3.4
Herbert, R. H.	9	3.231
Hobden, D. J.	15	8.42
Horie, Susumu	18	8.8
Hubbell, Charles H.	24	6.55
Hunter, P. J.	23	2.5
Inoue, Akio	7	2.9
	8	2.9
Ito, Keiji	16	6.32
Jackson, S.	26	9.19
Jafri, A. K.	22	9.13
Janicki, J.	14	4.60
Jones, James H.	6	0.8
Jordan, Carol	13	7.43
Kadaner, Ya. D.	24	2.8
Kalisz, L.	25	9.19
Kalus, Brigitte	16	7.51
Kamiya, Hisao	7	2.9
	7	2.9
Kaneda, Takashi	13	4.21
Karamosta, K.	25	9.16
Kautter, D. A.	3	0.5
Keatinge, W. R.	26	9.6
Khawaja, D. K.	22	9.13
Kikuchi, Takeaki	23	3.34
Kimata, Masao	16	8.4
	18	9.13
Kimura, Tomohiro	11	3.30
Konosu, Shoji	7	2.9
	7	2.9
	8	2.9
Kuznetsova, G. A.	22	9.13
Laine, Jorma J.	20	9.14
Landsberg, Hans H.	5	0.8
Lebedeva, G. D.	22	9.13
Lee, D. J. W.	5	0.7
Lee, Donald J.	18	9.14
Lerke, Peter	12	3.330
Lewis, Sue D.	21	9.16
Li, M. F.	13	7.43
Lilly, T., Jr.	3	0.5
Little, C.	2	0.31
Lynt, R. K., Jr.	3	0.5
Madey, J.	24	2.117
Maghan, Bruce W.	23	1.0117
Manohar, S. V.	15	7.81
Marking, Leif L.	26	9.15
Matthiessen, G. C.	19	9.16
McLeese, D. W.	17	9.13
	17	9.13
Meranger, J. C.	14	7.9
Miller, L. L.	3	0.34
Minter, Philip C.	25	9.6
Mires, D.	21	9.16
Mironov, G. A.	16	8.59
Miyake, Masato	16	7.89
Miyake, Sadayoshi	7	2.9
Mosier, A. R.	3	0.34
Mossel, D. A. A.	4	2.05
Nelson, R. W.	23	2.5
Nemerow, Nelson L.	12	3.339
Niinivaara, Fritz P.	20	9.14
Noguchi, Tamao	8	2.9
Nomura, Tadasi	17	8.59
	18	9.13
Notevarp, Olav	14	4.11
O'Brien, P. J.	1	0.31
	2	0.31
Okuzumi, Masayo	18	8.8
Orlob, Gerald T.	8	3.339
Ormerod, M. G.	2	0.33
Osborn, Kenneth W.	23	1.0117
Pantyukhina, S. V.	24	2.8
Pierpoint, W. S.	1	0.35
	1	0.35
Piskarev, A. I.	11	3.2495
Podeszewski, Zbigniew	15	7.89
Porter, J. W. G.	2	0.33
Potter, Norman	26	9.6
Regier, L. W.	11	3.2341
Remoli, Sergio	16	7.74
Reuter, H.	10	3.4
Rouser, George	16	7.594
Ryther, J.	19	9.16
Saisho, Toshio	7	2.9
Schut, J.	2	0.321
Seah, T. C. M.	15	8.42
Serianni, R. W.	2	0.33
Shrable, John B.	20	9.14
Siakotos, A. N.	16	7.594
Sikorski, Z. E.	24	6.54
Simpson, K.	13	4.14
Sinnhuber, Russell O.	18	9.14
Smith, Vernon L.	22	9.2
Snell, Neva	3	0.5
Snowden, F. Curtis	22	9.19
Solomon, H. M.	3	0.5
Somers, E.	14	7.9
Southcott, B. A.	9	3.12
Speck, M. L.	3	0.38
Spicher, Robert G.	8	3.339
Stangenberg, M.	25	9.16
Stenhage, Einar	14	4.11
Strasburg, Donald W.	24	1.9
Stryżewski, W.	8	2.1125
Suchecka, T.	25	9.19
Sunde, M. L.	13	6.193
Takahashi, Toyoo	23	3.34
Tanaka, Akiko	16	7.89
Tiemeier, O. W.	20	9.14
Tozawa, Harumi	9	3.15
	10	3.15
Tsuchiya, Yasuhiko	17	8.59
	18	9.13
Tsuruga, Hanato	25	9.19
Usuki, Riichirō	13	4.21
Vanderhorst, Richard	21	9.16
Varesmaa, Elina	20	9.14
Wales, J. H.	18	9.14
Warloe, Bjoern	14	4.15
Watson, J.	17	9.13
Wierzbowski, J.	14	4.60
Williams, A. P.	2	0.33
Wood, A. L.	11	3.2341
Yamanaka, Hideaki	9	3.15
Yamashita, Hideo	23	1.4
Yashouv, A.	25	9.16
Yasuda, Shigejirō	12	4.13
Yasumoto, Takeshi	7	2.9
	7	2.9
Yoshida, Tamao	7	2.9
Yoshida, Yoichi	16	8.4
	18	9.13
Zhuravleva, I. L.	16	8.59
Zimińska, H.	24	6.54

Subject	Page No.	Code No.
ANALYSIS, INORGANIC		
Determination of the Heavy Metal Content of Seafoods by Atomic Absorption Spectrophotometry	14	7.9
ANALYSIS, MOISTURE		
Use of Spinner Culture Cells to Detect Water Pollution	13	7.43
ANALYSIS, ORGANIC		
E.S.R. Studies of Nitroxide Probes in Lecithin-Water Systems	11	4.11
Chemical Composition of Fats	14	4.11
Mass Spectrometry in Fat Analysis	14	4.11
The Resolution of Complex Triglyceride Mixtures	15	7.594
An Assessment of Frozen Fish Based on Qualitative and Quantitative Changes of the Expressible Drip After Thawing	15	7.89
Fresh and Preserved Codfish (Gadus morrhua) Used as Food. III. Estimation of Protein Quality by Amino Acid Analysis	16	7.51
Phospholipid Composition of Human, Bovine, and Frog Myelin Isolated on a Large Scale From Brain and Spinal Cord	16	7.594
ANALYSIS AND COMPOSITION, SPECIFICATIONS AND OIL CONSTANTS		
Analysis of Packaging Oil for Mackerel and Possible Determination of Oil Quality	16	7.74
ANTIOXIDANTS		
Antioxidative Properties of the Alpha-Tocopherol With Some Amino-acids	14	4.60
APPARATUS AND EQUIPMENT, LABORATORY AND PLANT		
Crucibles of Science	1	0.11
Heat Loss Compensated Calorimeter	2	0.113
An Automatic Temperature Control Device	4	0.113
Salmon Color Sorter Developed by BCRC	4	0.12
AUSTRALIAN AND NEW ZEALAND FISHERIES		
Survey of Papua-New Guinea Prawn Potential	24	1.018
AUTHOR INDEX	27	
BACTERIOLOGY		
Chemical States of Bacterial Spores: Dry-Heat Resistance	3	0.5
Serological Studies of Clostridium botulinum Type E and Related Organisms. II. Serology of Spores	3	0.5
BILLFISHES		
Billfishes of the Central Pacific Ocean	24	1.9
BIOCHEMISTRY AND METABOLISM OF FISH		
Oxygen Consumption of the Spider Crab (Chionoecetes opilio) and the American Lobster (Homarus americanus) at a Low Temperature	17	9.13
Temperature Resistance of the Spider Crab (Chionoecetes opilio)	17	9.13
On the Biosynthesis of Sterols by the Holothurian Stichopus japonicus	18	9.13
Studies on the Marine Microorganisms Utilizing Inorganic Nitrogen Compounds--V. On the Uptake or Liberation of Inorganic Nitrogen Compounds by the Microorganisms as a Whole in Sea Water (1)	18	9.13
Changes in the Biochemical Composition of Two Common Catfishes (Wallagonia attu and Mystus seenghala)	22	9.13
Manganese Accumulation and Excretion by Freshwater Fishes and Other Aquatic Organisms	22	9.13
BYPRODUCTS, MISCELLANEOUS		
Feedstuffs -- 1969 Feedstuffs Analysis Table	24	6.55
CANNED FISH, PROCESSING		
Cannery Waste Treatment. II. Treatability	8	3.339

Subject	Page No.	Code No.
FISH CULTURE (Continued)		
Mixed Culture of Tilapia With Carp and Gray Mullet in Ein Hamifratz Fish Ponds	21	9.16
Potential of Sodium Sulfite Catalyzed With Cobalt Chloride in Harvesting Fish	21	9.16
Fish Breeding Possibilities in the Salt Water of Bituminous Coal Mines	25	9.16
Fish Farming Husbandry: Feeding and Induced Spawning	26	9.16
Preliminary Report on Induced Spawning of M. cephalus (L.) Reared in Captivity in Freshwater Ponds	25	9.16
FISH MEAL, NUTRITIVE VALUE		
A Short-Time Chick Assay for Unidentified Growth Factors	13	6.193
FISH PROTEIN CONCENTRATE		
The Effect of Fish Freshness on the Odour of Fish Protein Concentrate	24	6.54
FISHING METHODS		
Tuna Hunting May Be Unnecessary	7	2.149
FOOD TECHNOLOGY		
Desalted Seawater for Agriculture: Is It Economic?	5	0.8
FRESHNESS OF FISH		
Some Properties of the Fluorescence of Fish Muscle	15	7.81
Studies on Fish Meat Jellies (Fish Sausage)--IX. Relation between pH of Fish Meat Paste and Elasticity of Fish Meat Jellies	16	7.89
Studies on the Bacterial Flora in the Intestines of Various Marine Fish	18	8.8
FROZEN FISH, CHANGES IN DURING STORAGE		
Changes in the Histological Structure and Hydrophilic Properties of Fish Tissue During Storage in Subfrozen State	11	3.2495
FROZEN FISH, PROCESSING		
An Engineer's Guide to Cold Store Practice. 16--Cold Store Lifts	9	3.231
Gas Seeks a Future in Air Conditioning	10	3.231
Study Blast Freezer Effects on Fillets	11	3.2341
Steam Thawing for High Quality Fish	12	3.27
GEAR, FISHING		
Catching Fish by Ring Nets	8	2.1125
ICHTHYOLOGY		
Names of Fishes	17	9.12
MARINE PLANT PRODUCTS		
Free Amino Acids and Peptides in Marine Algae	16	6.32
NORTH AMERICA, U.S. FISHERIES, GULF OF MEXICO		
Gulf of Mexico Shrimp Atlas	23	1.0117
NUTRITION AND MEDICINE, GENERAL		
The Effects of Vitamin E Deficiency on the Total Fatty Acids and the Phospholipid Fatty Acids of Rat Tissues	5	0.7
Vitamin E and Hepatotoxic Agents. 1. Carbon Tetrachloride and Lipid Peroxidation in the Rat	5	0.7
Discussion and Suggestions on the Nutrient Requirements of the Pig	6	0.7
Vitamin E and Hepatotoxic Agents. 2. Lipid Peroxidation and Poisoning With Orotic Acid, Ethanol and Thioacetamide in Rats	6	0.7
OILS, CHEMICAL AND PHYSICAL PROPERTIES		
Studies on the Nature of the Taste of Lipids. I. Influence of the Unsaponifiable Matter Contained in Thermally Oxidized Soybean Oil	13	4.21

A Study of Pasteurization as a Means of Extending the Low-Temperature Storage Life of Dungeness Crab and Shrimp 12 3.330
Experiences of Cannery and Poultry Waste Treatment Operations 12 3.339
Poultry Processing Waste Treatment at Millsboro, Delaware 12 3.339

CHEMISTRY AND BIOCHEMISTRY, MISCELLANEOUS
Intracellular Mechanisms for the Decomposition of a Lipid Peroxide. I - Decomposition of a Lipid Peroxide by Metal Ions, Heme Compounds, and Nucleophiles 1 0.31
o-Quinones Formed in Plant Extracts. Their Reactions With Amino Acids and Peptides 1 0.35
o-Quinones Formed in Plant Extracts. Their Reaction With Bovine Serum Albumin 1 0.35
Intracellular Mechanisms for the Decomposition of a Lipid Peroxide. II - Decomposition of a Lipid Peroxide by Subcellular Fractions 2 0.31
Meat and Meat Products 2 0.321
DNA Strand Breakage in Cells Irradiated with X-rays 2 0.33
Blood Amino Acid Levels and the Course of Digestion in Rats of Native and Heat-Damaged Cod Muscle Protein 2 0.33
Photochemical Decomposition of DDT by a Free-Radical Mechanism 3 0.34
Low Temperature as an Environmental Stress on Microbial Enzymes 3 0.38

COMPOSITION, INORGANIC
Manganese in the Fresh Water Clams 15 8.42
Studies on the Marine Microorganisms Utilizing Inorganic Nitrogen Compounds--IV. On the Liberation Rates of Inorganic Nitrogen Compounds From Bottom Muds to Sea Water 16 8.4
Struvite Formation in Tuna Canned in Brine, Especially Its Distribution and Solubility 23 3.34

COMPOSITION, ORGANIC
Studies on the Lipids of Japanese Littleneck, Tapes japonica Deshayes. III. On the Ceramide 2-Aminoethylphosphonate 12 4.13
Sperm Whale Head Oil. Part I. The Ester Fraction 13 4.14
Hydrocarbon-Containing Marine Oils 14 4.15
Gas-Chromatographic Analysis of Amines in Volatile Substances of Salmon Caviar 16 8.59
On the Unsaponifiable Fractions of Holothurians Stichopus japonicus and Holothuria tubulosa 17 8.59

COOKERY
In Vitro Study of Meat and Fish Protein Sensitivity to Proteolytic Enzymes After Ultra-High-Frequency (UFH) Heating 24 2.8

DATA SYSTEMS
Processing of Digital Data Logger STD Tapes at the Scripps Institution of Oceanography and the Bureau of Commercial Fisheries, La Jolla, California 6 0.8

DISEASES AND POISONS OF FISH
Toxicity of Rhodamine B and Fluorescein Sodium to Fish and Their Compatibility With Antimycin A 26 9.15

ECONOMICS AND STATISTICS
Report of the Secretary of the Interior to the President and the Congress on the Effects of Imports on the United States Groundfish Industry 21 9.2
On Models of Commercial Fishing 22 9.2

FISH CULTURE
Synergism Between Cyclopropenoid Fatty Acids and Chemical Carcinogens in Rainbow Trout (Salmo gairdnerii) 18 9.14
Aquaculture--Its Status and Potential 19 9.16
CPA, Other Southeastern Firms See Catfish as Adjunct to Poultry Industry 19 9.16
"Tsukiisos" and "Gyoshos" -- A Review of Artificial Reefs Research 19 9.16
Two Reports Offer Useful Insight Into Oyster Farming Techniques 19 9.16
Effect of Diet on the Fatty Acid Composition of Salmo gairdnerii 20 9.14
Effects of Temperature on Rate of Digestion by Channel Catfish 20 9.14

PERIODICALS AND BOOKS
Information on Health Aspects of Pesticides 25 9.6
Fish Periodical 26 9.6
Food Science 26 9.6
Survival in Cold Water 26 9.6

POLLUTION
Uptake and Retention of Malathion by the Carp 21 9.19
Analysis Instruments Aid Pollution Control 22 9.19
Application of Cybernetic Techniques to Study the Dynamics of Radioisotope Accumulation by Some Sea Organisms 25 9.19
Biological Ponds as the Third Stage Of Sewage Treatment 25 9.19
Some Long-Lived Radionuclides in Marine Organisms on the Pacific Coast of Japan 25 9.19
Progress in Waste Disposal Research and Development 26 9.19
Sewage, Trade Wastes, and River Pollution 26 9.19

PRESERVATION, IRRADIATION
Color Regeneration of Frozen Tuna Meat by Gamma-Ray Irradiation 9 3.15
Studies on the Irradiation Cleavage of Trimethylamine Oxide in Fish Flesh--II. Acceleration of DMA Formation by Addition of Gadoid Fish Viscera 9 3.15
Studies on the Irradiation Cleavage of Trimethylamine Oxide in Fish Flesh--I. Decomposition Products Found in Several Fishes 10 3.15

PRESERVATION AND SANITATION
Comparative Effectiveness of Ethylene Diaminetetraacetic Acid and Chlortetracycline for Fish Preservation 9 3.12

REGULATION AND INSPECTION
Florida Legalizes Aquaculture 22 9.3

ROCKFISH AND ROSEFISH
Haematological Study of a Species of Rockfish, Sebastiscus marmoratus--V. Seasonal Changes of Blood Elements, Electrophoretic Pattern of Serum Proteins and Their Percentage Fractions 23 1.4

SHELLFISH AND CRUSTACEANS, MISCELLANEOUS
Monolayers of Chitin 23 1.89

SMOKED FISH
Smoking 10 3.4

SPOILAGE
Microbiology 4 2.05
Study on Greening of Canned Oysters 11 3.30

TOXICITY
Screening of Toxic Crabs in the Ryukyu and Amami Islands 7 2.9
Studies on Marine Toxins. XX. Ciguatera in the Ryukyu and Amami Islands 7 2.9
Studies on Marine Toxins. XXI. Occurrence of Ciguatoxin and Ciguaterin in Ciguatoxic Fishes in the Ryukyu and Amami Island 7 2.9
A Further Examination on the Toxicity of Three Species of Xanthid Crabs 8 2.9

TRANSPORTATION
Shipping Live Dungeness Crabs by Air to Retail Markets 23 2.5

VESSELS, FISHING
The Japanese Approach to Danish Seine Netting 5 2.114
Fending Off Boats 6 2.114
New Polish Stern Trawler in Plastics 24 2.117

GPO 996-323

UNITED STATES
DEPARTMENT OF THE INTERIOR
U.S. FISH AND WIDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES
DIVISION OF PUBLICATIONS
BLDG. 67, U.S. NAVAL AIR STATION
SEATTLE, WASHINGTON 98115

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States — now and in the future.